Commonwealth Bureau of Plant Breeding and Genetics

Plant Breeding Abstracts

Vol. XVIII, No. 2

(Abstracts Nos 585—1312)

School of Agriculture
Cambridge
England

1st April, 1948

TABLE OF CONTENTS

Note.—Initialled abstracts are written by the following:

Mr N. T. J. Bailey	N. T. J. B.
Mr C. Barclay	C. B.
Dr T. P. Boygó	T. P. B.
Mrs E. M. Fischer	E. M. F.
Mr J. L. Fyfe	J. L. F.
Dr J. G. Hawkes	J. G. H.
Dr C. Oppenheimer	C. O.
Mrs R. H. Richens	R. H. R.
Mr K. Shepherd	K. S.
Miss E. Wilson	E. W.
Mr I. Zacopanay	I. Z.

* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XVIII, No. 2

*STATISTICS 519

585. 519.24
Grafico de James F. Crow. (**Graph of James F. Crow**).
Rev. Asoc. Ingenieros Agron. Montevideo 1946 : **18** : No. 75 : 36–37.
A chart of χ^2 and t values designed by J. F. Crow is reproduced for Spanish readers.

586. BARTLETT, M. S. 519.24
Multivariate analysis.
Suppl. J. Statist. Soc. 1947 : **9** : 176–97.
The topics discussed in this exposition of the theory and application of multivariate analysis include multivariate analysis of variance, canonical analysis, discriminant functions and the sampling distribution of canonical roots. Comments follow by Geary, Burt, Wishart, Radhakrishna Rao, Herdan, C. A. B. Smith and Moroney.

587. BRIEGER, F. G. 519.24
Limites unilaterais e bilaterais na análise estatística. (**Unilateral and bilateral limits in statistical analysis**).
Bragantia, São Paulo 1946 : **6** : 479–545.
Tables are presented of unilateral and bilateral limits of t, unilateral and bilateral limits of θ, the Gauss and Pearson distributions, the limits of χ^2 and the relative deviate in the Pearson distribution, and precision limits. An introductory section explains in what ways these tables are useful.

588. BROWN, G. W. 519.24
Discriminant functions.
Ann. Math. Statist. 1947 : **18** : 514–28.
The theory and application of discriminant function technique is outlined for unidimensional and multidimensional problems.

589. CARTER, A. H. 519.24
Approximation to percentage points of the z-distribution.
Biometrika 1947 : **34** : 352–58.
An approximation formula is presented for calculating percentage points of z_1 when n_1, n_2 are large.

590. CONAGIN, A. 519.24
Algumas noções de estatística. (**Some statistical notions**).
Rev. Agric. S. Paulo 1947 : **22** : 119–34.
An elementary introduction is given to the following statistical ideas: population, sample, mean, range, variability, standard deviation and the t-test.

591. DAVID, F. N. 519.24
A χ^2 "smooth" test for goodness of fit.
Biometrika 1947 : **34** : 299–310.
A T test is described to supplement the χ^2 test for assessing the agreement between hypothesis and observation. The T test takes into account the signs of the deviations, whether positive or negative, and their order.

592. GEARY, R. C. 519.24
Testing for normality.
Biometrika 1947 : **34** : 209–42.
It is shown that serious errors may result from the use of tables of z and t, if the universes from which the samples are drawn are not normal. A detailed discussion follows on the most efficient tests of normality.

---

* General studies, see also individual crops.

593. LETESTU, S. 519.14
Note sur l'analyse discriminatoire. (Note on discriminating analysis).
Experientia, Basel 1948 : **4** : 22–23.

The method of obtaining discriminant functions is outlined, and it is shown that at least one positive solution always exists of the equation

$$\left| d_{1_m} - \rho c_{1_m} \right| = 0.$$

594. NISSEN, Ø. and OTTESTAD, P. 519.24
On the analysis of variance and the effect of non-normality.
Meld. Norg. LandbrHøgsk. 1943 : **23** : 475–88.

The F distribution of a normal universe has been compared with that of various non-normal universes, viz. rectangular, bimodal, unilateral skewed and U-shaped universes. Comparisons were made for small numbers of observations and samples, and for coarsely grouped data. It was found that, in general, the F distributions of the non-normal universe did not differ greatly from that of the normal universe except in the case of the U-shaped universe.

595. TALEKAR, V. L. 519.24
New methods of obtaining squares of numbers.
Curr. Sci. 1947 : **16** : 337–38.

General formulae are given which provide the basis of the simple methods of calculating the squares of numbers devised by A. A. Siddiqi (cf. Abst. 1).

596. TAVARES, H. 519.24
Confiança nos resultados experimentais. **(Confidence in experimental results).**
Bol. Sec. Agric., Pernambuco 1945 : **12** : 293–98.

An elementary exposition is given of the concepts of significance testing, standard error, standard deviation, and probability levels.

597. WINSOR, C. P. 519.24
Which regression?
Biometrics Bull. 1946 : **2** : 101–09.

The following questions are considered. Given a sample set of pairs of values x and y, what regression should be used, y on x or x on y? This is shown to depend on how x and y were obtained and on the use to be made of the regression. Two methods of obtaining x, y are treated, viz. random sampling, and selecting a set of values of one variable and measuring the corresponding values of the other. With regard to the use of the regression, four possibilities are investigated: (1) the estimation of y from a future measurement of x; (2) the estimation of x from a future measurement of y; (3) the estimation of the true value v, given a future measurement x, or u given y; and (4) the estimation of the true relation between u and v.

598. BOND, T. E. T. 519.24:581.5
Some Ceylon examples of the logarithmic series and the index of diversity of plant and animal populations.
Ceylon J. Sci. 1947 : **12** : Sect. A : 195–202.

The composition of the weed flora of a Ceylon tea plantation was analysed using the index of diversity of Fisher, Corbet and Williams (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 363). A wide discrepancy between the observed and calculated values of plant densities is attributed to the effect of selective weeding.

599. CAPÓ, B. G. 519.24:631.421
A method of interpreting the results of field trials.
J. Agric. P. Rico 1944 : **28** : 7–21.

A method of analysing the results of field trials is described, in which the assumption is made that an effect constant can be allocated to each different pair of adjacent plots in the field. Then, by fitting a multiple regression equation to the experimental results, it is possible to estimate the effect constant of each of the treatments applied.

600. Capó, B. G. 519.24:631.421
A new method of performing field trials.
J. Agric. P. Rico 1944 : **28** : 22–34.
In connexion with the 2-plot block method of analysing experimental results advocated by the author in an earlier paper (cf. Abst. 599), appropriate field lay-outs and methods of calculating results are described.

601. Harshbarger, B. 519.24:631.421
Preliminary report on the rectangular lattices.
Biometrics Bull. 1946 : **2** : 115–19.
A lattice design is described in which the varieties need not be a square but may be the product of two consecutive integers. The blocks are all the same size and the variety means are adjusted for information both between and within blocks.

602. Kempthorne, O. 519.24:631.421
A simple approach to confounding and fractional replication in factorial experiments.
Biometrika 1947 : **34** : 255–72.
Factorial arrangements of the type p^n may be conceived as n-dimensional lattices, each of whose axes represents a factor, the treatment combinations being represented by points in the n-dimensional space. Interactions may then be calculated by constructing hyperplanes containing the relevant lattice points. This model is used to elucidate confounding and fractional replication. Brief consideration is given to the multifactorial experimental designs of Plackett and Burman.

603. Radhakrishna Rao, C. 519.24:631.421
Factorial experiments derivable from combinatorial arrangements of arrays.
Suppl. J. R. Statist Soc. 1947 : **9** : 128–40.
In this paper the general configuration of arrays of strength "d" which supply basic combinatorial arrangements leading to designs for factorial experiments involving simple analysis of results has been defined and some methods of construction are discussed. Some of the problems considered are the construction of:

(*a*) multifactorial designs similar to those of Plackett and Burman (1946), but leading to the estimation of main effects and interactions up to the order k when interactions of order equal to and greater than d ($>k$) are absent,

(*b*) block designs for symmetrical factorial experiments involving only a subset of treatment combinations and preserving main effects and interactions up to a given order when higher order interactions are absent, and

(*c*) a new series of asymmetrical factorial designs derivable from arrays of strength 2.

This method leads to possible arrangements of multifactorial designs of the type introduced by Plackett and Burman (1946) when the number of levels need not necessarily be a prime or a prime power.
The existence of block designs leads to arrangements of fractional replication in the case of symmetrical factorial experiments. They give rise to multifactorial designs arranged in blocks so that a source of variation affecting groups of treatments can be eliminated.

604. Rigney, J. A. 519.24:631.421
Some statistical problems confronting horticultural investigators.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 351–57.
A non-mathematical discussion is presented of factorial experiments, sampling techniques and experimental designs. The author suggests that in factorial experiments there may be a tendency to multiply treatments to complete a design rather than to obtain useful information. With regard to sampling techniques, it is thought that more research is required in order to guarantee reliable methods. The experimental designs advocated are the randomized block design and the lattices.

605. HARTMAN, J. and STAIR, E. C. 519.24:635.64
Correlation of means and standard deviations in tomato field experiments.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 337–40.
A correlation between mean and standard deviations has been observed in tomato variety tests.

*BREEDING 575

606. SEARS, E. R. 575(73)
Genetics and farming.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 245–55.
A simple account is given of genetical investigations which have made important contributions to the improvement of crops in the United States during recent years, or which are likely to do so in the future. The article refers to the use of hybrid vigour in maize and lucerne; the occurrence of spontaneous mutations in inbred lines of maize affecting hybrid vigour; the technique of "gamete selection" in maize, originated by Stadler (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 986); the possible role of male sterility in the utilization of hybrid vigour in various crops; induced polyploids; the value of whole chromosome deficiencies in factorial analysis; and the genetics of micro-organisms.

607. HAAN, H. DE 575:35(49.2)
The protection of the property of the potato breeder in the Netherlands.
Amer. Potato J. 1947 : **24** : 374–77.
The legal measures defined in the Plant Breeder's Decree which was put into force in the Netherlands in 1941 are discussed (cf. Abst. 655).

608. 575:631.521.6
Heredity *vs* disease.
Sci. and Cult. 1946 : **11** : 546–47.
The inheritance of disease resistance and the breeding of disease resistant crops are discussed. It is pointed out how the development of pure lines has facilitated the spread of infection. The crossing of crop plants with wild species to restore diversity is indicated as the remedy of this situation.

609. CILLIS, U. DE 575:633(21.3)
Il miglioramento delle piante coltivate nei paesi tropicali e subtropicali.
(The improvement of plants grown in tropical and sub-tropical countries).
Publ. Staz. Speriment. Granicolt. Sicilia 1942 : No. 8 : Pp. 60.
Special mention is made of the breeding work of Nazzareno Strampelli in raising the wheat yields in Italy and its dependencies, then of the well known achievements in breeding various tropical plants in Java, India, North Africa, South America and elsewhere. Recent developments are then outlined for the principal tropical crops individually, namely rice in Japan, India and elsewhere; maize, with special mention of hybrid corn in the U.S.A., sorghum in Africa and U.S.A.; sugar cane, especially the polyploid canes of Java and the interspecific crosses in India; citrus fruits, where improvement has been achieved through vegetative selection on the one hand and interspecific crossing on the other; banana, in which the studies made in Trinidad are mentioned particularly; tobacco, where forms with both high and low nicotine are among the products of plant breeding; and cotton, where genetical, systematic and cytological researches published by a whole series of investigators are referred to, as well as the notable achievements in improving yield, quality and disease resistance. Other plants referred to rather more briefly are tea, coffee, cacao, ramie, groundnut, castor oil, oil palm, coconut and rubber.

---

* General studies, see also individual crops.

610. ROBB, W. 575:633(41)
Research and the farmer. VI.—Plant breeding.
Scot. Agric. 1948 : **27** : 153–58.
An account is given of the history and activities of the Scottish Plant Breeding Station.

611. 575:633(42.23)
34th Annual Report of the East Malling Research Station, Nr. Maidstone, Kent 1946 (1947) : Pp. 168.

Hatton, R. G. and Rogers, W. S. — *General review of research work with list of papers published during the year.*

I. Pomology. (*pp.* 16–25).

Tree fruits
The results of breeding investigations on the apple, pear and plum have previously been summarized (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 515).
The following investigations are reported in the annual report for 1946:—
Various studies on frost injury in the apple are in progress, including investigations on the technique of testing for the resistance of the flowers. An artificial freezing technique is in use.
Research is being carried out on the biennial bearing habit in different apple varieties.
Apple rootstocks immune to woolly aphis will shortly be available. These apples are also now fruiting as scion varieties on M. IX; several appear to merit further trial.
A large number of scion plum varieties were budded on each of the two rootstocks, Brompton and Common Plum; it is hoped that the resulting trees will form the basis of a national collection of plum varieties.
The cherry varietal collection was re-worked on the Mazzard rootstock F12/1.
The search for satisfactory dwarfing cherry rootstocks continues. So far rootstocks of *Prunus Cerasus* and some other species have not proved sufficiently compatible with sweet cherry varieties; use of root cuttings from trees of *P. avium* showing restricted growth is under consideration.

Raspberry
The Malling E (No. 33/132) and Malling L (34/42) seedlings, already distributed, have been named Malling Enterprise and Malling Landmark, respectively (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 83).
New seedlings are under observation.

Blackcurrant
Cropping trials of seedlings obtained from crosses between the chief commercial varieties were continued. Several seedlings showed promise; one of these seedlings has been sent for trial to the National Fruit Trials; it has exceptionally late maturing fruits.

Strawberry
Families from crosses involving Royal Sovereign, Sir Joseph Paxton, Huxley and Pillnitz are under investigation.

Hoblyn, T. N. — *II. Statistics and records.* (*pp.* 26–28).
The investigations discussed include the analysis of field records of experiments on fruit crops, studies of variation such as the variation of the P.V. value in the Fuggles hop variety, recording technique, and the design of field experiments on fruit trees.

Beard, F. H. — *VIII. Hops. A.–Varieties and cultivation trials.* (*p.* 44).
Detailed trials are being carried out on early and late Goldings clones.
New varieties raised at Wye are under test for their yielding capacity and P.V. values.
Ease of picking in different varieties is being studied.

Keyworth, W. G. — *VIII. Hops. B.–Diseases of hops.* (*pp.* 44–45).
The trials of the resistance of Wye seedling varieties to *Verticillium* wilt were continued.
Strains of *V. albo-atrum* and *V. Dahliae* are under investigation.

A grafting experiment was begun in collaboration with the Long Ashton Research Station, Bristol, with a view to determining whether the split leaf blotch disease is graft transmissible.

Harris, R. V. and Cadman, C. H. — *A.R.C. Scottish Raspberry investigation.* (*pp.* 47–48).

Investigations carried out by the Agricultural Research Council on virus diseases of the Scottish raspberry crop are reported. Experiments have shown that both the common raspberry aphids, *Amphorophori rubi* and *Aphis idaei*, can act as vectors of certain raspberry viruses. Relatively few of the virus symptoms dealt with appear to be of a simple nature; and the more severe types of disease responsible for degeneration are obviously due to complex virus associations.
In the attempt to obtain virus-free stock of the variety Lloyd George, samples of cane introduced from New Zealand have been found to be virus free (cf. Abst. 1205).
Experiments on the leaf curl virus disease are reported.

Modlibowska, I. — *"Green blotch", an abnormal tissue of apple fruits, probably associated with spring frost.* (*pp.* 62–65).

Green blotch damage originates from an internal crack in the cortex, probably due to spring frost. The occurrence of this condition among different apple varieties is indicated; the variety found to suffer most was Ellison's Orange.

Rogers, W. S. — *Developments in the isolated block system for raising strawberry runners.* (*pp.* 66–73).

Experiments carried out to compare various designs and spacings of isolated blocks for strawberry propagation are described.

Pearce, S. C. — *The measurement of fruit crops by sampling.* (*pp.* 77–82).

A discussion is given of methods developed at the East Malling Research Station for estimating the total weight and fruit size (weight of 100 fruits) of crops of apple, pear and plum, and fruit colour in apples.

Harris, R. V. — *A review of some recent research on virus diseases of raspberry and strawberry in Great Britain.* (*pp.* 113–17).

Research on virus diseases of the raspberry and strawberry are reviewed under the following headings: the spread of virus diseases by vegetative propagation; the diseases and their transmission; methods of analysing the virus complexes; strawberry virus analysis; and raspberry virus analysis.

Keyworth, W. G. — *Mosaic disease of the hop. A study of tolerant and sensitive varieties.* (*pp.* 142–48).

An account is given of the work of surveying commercial plantations of the Fuggles hop for mosaic carrier plants by means of grafting experiments, and of observations on the incidence of mosaic disease in Goldings hops planted near to Fuggles. The article also describes the selection of mosaic sensitive and tolerant male varieties, and methods of testing the reaction to mosaic of Wye seedlings.

Keyworth, W. G. — *Notes on varieties of hop resistant to Verticillium wilt.* (*pp.* 157–59).

Information on the cultural and brewing qualities of the *Verticillium* wilt resistant hop varieties, OB53 (Nonesuch Hop), OM 26, AEE 55, OR 55, OJ 47, 219 and 1147, is summarized; OR 55 and OJ 47 appear to be the most generally acceptable varieties.

Glen, E. M. — *Growing walnuts in England.* (*pp.* 160–64).

An account is given of walnut propagation and cultivation in England, including notes on the chief diseases of the walnut and on the varieties Franquette, Mayette, Meylanaise, Chaberte, Excelsior of Taynton, Northdown Clawnut and Secrett.

612. 575:633(45)
Stazione Agraria Sperimentale, Bari. Relazione sull'attività della stazione dal 1938 al 1943. (**Agricultural Experimental Station, Bari. Report on the activities of the Station from 1938 to 1943**). 1946 : Pp. 71.

In the section on cereal breeding of this report it is mentioned that in southern Italy the early varieties of soft wheat such as Roma, Littorio, Mentana, etc. yield better than the local wheats on the better soils but not on poorer land. For the latter, special selections of the local wheats have been made and these have given promising results not only in south Italy but in north Africa and as far afield as Greece and Australia; they comprise varieties of both *Triticum durum* and *T. vulgare*. The influence of various environmental factors on the yield and quality of a number of wheat varieties has been studied.
Experiments to test the point have given certain indications that higher yields have been obtained in north Italy from certain cereal varieties when the seed sown was grown in the south. The reverse phenomenon was also occasionally observed.
Tests of maize varieties have shown that certain forms from north Italy, such as Ibrido Bergamasco [Bergamo Hybrid], S. Pancrazio, Nostrano dell'Isola, etc. combine a sufficiently short growth cycle with sufficient resistance to spring cold to enable them to give a crop before the summer drought. A white variety developed by the experiment station at Bari and named Navajo, is high in oil and protein content, tillers abundantly, and is drought resistant; it is therefore valued for forage purposes.
A start has been made with selection work with various forage legumes such as *Vicia* spp., *Lathyrus ochrus, L. clymenum* and *Medicago* spp. and with sweet sorghum, and tests with a number of new forage plants have also been instituted. *Dorycnium rectum*, a wild species from Puglia, gives good permanent pastures in the better soil of the southern Mediterranean and the same applies to another wild species, *Psoralea bituminosa*.
Studies have been made of the local varieties of almond (cf. Abst. 471), of olive and of citrus fruits.

613. Guščin, G. G. 575:633(47)
(**Increase the efficacy of breeding work**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : No. 9–10 : 13–15.

The plant breeding stations in Kazahstan are criticized for having an insufficiently clear definition of the varieties they are attempting to produce, both as regards agricultural features and special industrial requirements. The majority of stations confine their breeding work to selection from existing material and have not introduced methods such as sexual and vegetative hybridization or Lysenko's method of transforming the nature of the plant. Insufficient attention is given to collections of initial material. A further defect is the inadequate attention given to fertility and general condition of the breeding plots. The system of keeping records is most inadequate and often no records of field observations seem to exist. Lastly, no observations are made on the agronomic behaviour of the varieties.

614. Kobaev, N. S. and Priezžev. 575:633(47)
(**Thirty-five years at the Nosov State Breeding and Experiment Station**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : No. 9–10 : 16–19.

Selection work has been carried out with the famous Nežinskiĭ cucumber and several improved types have been issued. Selection in onions has led to several improved types, including one annual variety. Tomatoes and table beet have also been improved by selection.
Crosses have been made of *Triticum vulgare* with *T. durum* and the hybrids have been crossed with rye; in this way new wheats distinguished by great frost resistance and high yield have been obtained. Other products of selection are three buckwheat varieties

exceeding the standard variety Bogatyrj in yield by 25–30%, red clovers with increased cold resistance, and improved forms of rye and barley.

615. 575:633(48.5)
633–1.521.5(48.5)
Förädlingsarbetets organisation och kontrollen över utsädesvaror. (**The organization of breeding and the control of seed for sale**).
Weibulls Ill. Arsb. 1946 : **41** : 4–5.
This is a brief note on the methods at the Weibullsholm Plant Breeding Institute and its organization and research staff, the range of crops used in experimentation, and on seed production and its control by the Swedish State Central Seed Control Institute [Statens Centrala Frökontrollanstalt].

616. 575:633(48.5)
Sveriges utsädesförenings filialer. (**The Branch Stations of the Swedish Seed Association**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 343–80.
The history of the establishment of the Swedish branch stations, and the advantages of such a chain of centres for variety trials and other research problems related to crop breeding are outlined in this symposium by many authors. Information is also given on the collaboration between the local stations and the institute at Svalöf; the independent breeding operations conducted at the local centres; the size and cost of the branches; details of the plant breeding work and trials conducted at the Ultuna, Östgöta, Kalmar, Västgöta, Värmland, Västernorrland, Jämtland, and Övre-Norrland branch stations, with notes on the varieties of different crops produced. Many of the numerous varieties listed have been mentioned from time to time in *Plant Breeding Abstracts*.
In conclusion plans are mentioned for the establishment of two new branch stations, one for Västerbotten and one for Umeå, as well as a number of substations in various localities. Modernized buildings and equipment and acquisition of land for additional permanent breeding plots have also been advocated.

617. *Åkerman, Å. 575:633(48.5)
Årsberätelse över Sveriges Utsädesförenings verksamhet under år 1945. (**Annual Report on the work of the Swedish Seed Association during 1945**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 411–83.
New varieties and élites released in 1945 to the General Swedish Seed Co., Ltd,. and the Swedish Sugar Factories Co. Ltd., include: the winter wheats, Å 0846 (= A 22/63), a hybrid from Thule II x Sammets, which is winter hardy and high yielding and intended for the most northerly parts of the wheat growing district, No. 01092, a new élite from an older one of Svalöf Skandia, which has been grown under severe conditions in Västergotland for several years, and U 01392 b, a new élite; the black oat U 01371 from the Ultuna Station, from Engelbrekt II x Extra Klock, with high yield and exceptional grain quality, a possible substitute for the still higher yielding U 01380; the yellow pea 03023, a new culinary variety nearly as early as Torsdags II [Thursday II] and higher yielding, obtained by selection at Svalöf from a mixed population; the fibre flax 015 b, a new Blenda type, higher yielding and stiffer strawed, and 0220, from 036 x 061 (the former parent from segregating material, the latter from Herkules x Italian), higher yielding and stiffer strawed than Herkules; the linseed 01040, selected from Rumanian flax from Studina, superior to Svalöfs Renodlat [Svalöf Pure-bred] and Atlas in yield of seed; the potatoes, 39153, a wart immune industrial variety from Ackersegen x Gammal Svenskröd [Old Swedish Red], surpassing Ackersegen and Voran in yield and having a high starch yield though the actual starch content of the tubers is not particularly high, 39178, an industrial variety from Ostbote x Parnassia, high yielding with high starch content, but not immune to wart, 39108, a wart immune variety for industrial and table purposes, from Ostbote x Majestic, with a high yield of tubers and starch, especially on relatively dry and poor soils, and 38171, a wart

* An extended summary of this paper is on file at the Bureau.

immune table potato from Alfa x 19149, higher yielding than Ackersegen and Voran, with whitish yellow flesh, and superior to all other high yielding table potatoes in quality.
Work at Svalöf included the following:—

Cytology
A small experiment on timothy with chromosome numbers varying from 21 to 90 was harvested and plants with the normal 42 proved superior to the other plants.
Trials of tetraploid sugar beets, fodder beets and sugar mangels showed the tetraploids to be somewhat lower yielding than the diploids. Some of the sugar mangels had a very low dry matter yield. An F_2 from a tetraploid sugar beet x diploid fodder beet cross was analysed for chromosome number, morphological characters and yield. Some tetraploid pedigree white mustard was raised for selection for fertility and similar material of tetraploid turnip rape was also laid down. The rape with double chromosome number was so poor that the work on it was not extended.
The Flax Section raised a large amount of tetraploid linseed and fibre flax, including some new hybrids from crosses between the best types in the F_4 from diallel crosses of tetraploids.
Research was continued on the effect of different chemical substances, especially solutions of inorganic salts, on nuclear division. Salts of various metals in suitable concentrations exhibited the same effect as colchicine.
X-irradiation of different crops, including barley, wheat and oats, was continued, and pronounced morphologically aberrant forms as well as scarcely perceptible physiological mutants were obtained from different lines of two-rowed barley. Many mutants of spring and autumn wheat were also produced.
Field trials with the best mutants from Gull barley confirmed the finding that some mutants may yield more than the original lines.
Two years' yield trials with Maja barley mutants showed that some extremely stiff-strawed types equal the parent lines in type. One morphological mutant of great interest, *erectoides* 16, ripens at least a week before Maja, has considerably stiffer straw, and yields only 5% less than the parent lines. Some physiological mutations seem to be clearly superior to it.
The first tests of malting properties in barley mutants have shown that in some cases these characteristics are superior to those of the parent line.
Early mutants of oats have been included in preliminary yield trials. Though the yield has fallen, in some cases it is still good, in spite of the increased earliness. Large scale hybridization experiments have been made with oats and two-rowed barley.
A peculiar yellow-green X-ray mutation in flax has shown increased yield of straw and the same yield of seed as the parent line, and improved fibre quality.

Autumn wheat
In breeding for high yield combined with greater winter hardiness results from previous field experiments were confirmed by artificial freezing tests. The following varieties are recorded as the most productive in the larger trials: W's Eroica, Hansa, Trifolium 14, 01157 b (from Standard x Trifolium 14), 01092 (from Skandia I) and Standard II. Among the less extensively tested varieties, 01300 (from 0984 x Roter Kolben), 01420, 01342 and 01392 (from Ergo and Gluten) produced about 3900 kg. per ha.

Spring wheat
Bad weather caused lodging in which varietal differences were marked.

Oats
The aim is to produce varieties for southern Sweden, superior to existing varieties in yield, straw stiffness, and grain quality. Good progress has been made with some crosses of Örn [Eagle] with other types in combining high yield, earliness and quality. Other hybrids, e.g. 01422 x 01431 and 01182 x Guldregn II [Golden Rain II], and crosses with lines from white grained land oats are also under observation. Large scale experiments are in progress with hybrids of white oat varieties, e.g., Sol II, Seger [Victory], Stjärn [Star] and Guldregn, crossed with such early oats as Gopher, Finnish Kytö and Vidur, the object being to obtain early types suitable to inland and high lying parts of Sweden with high yields and stiff straw.
Drought affected the crop and yields were depressed. The best was Sv 41/65 (a white grained line from 01450) with 4000 kg. of grain per ha.; next came Sv 44/529 (from Örn x

01535), Sv 38/501 b_2 (from 01401 x Örn), Sv 38/293 b (from 01422 x 01422), Örn, and Sv 43/221 (from Dippes Früh x Örn).
Of the extremely early white varieties, Vrm 41/68 (from Kytö x Guldregn II) and 01466 b_1 (from Seger x Gopher) showed the best yields of grain, the former producing 3340 kg. per ha. The early black oats Orion III and Å 01390 (from Orion II x Sirius) gave the best yields of grain in their group.

Autumn rye
Work was continued at Svalöf and Ugerup on the same lines as in 1944. Selection combined with progeny tests was also initiated on a small scale. Sv 36/28, Malm and lines from Stål [Steel] crossed with Petkus, Sangaste or Malm equalled Stål, Kungs [King's] and Petkus in yield. Quality in general was good.

Spring rye
The breeding material mentioned in the 1945 report has been transferred to Ugerup and progeny tests are being made.

Maize
Selection of commercial and hybrid populations for earliness and high yield was continued at Ugerup, Svalöf and Brandeborg.

Barley
Of the malting varieties, line b_7, an Ymer selection, was again outstanding in grain yield giving 4090 kg. per ha. while the commercial varieties, Ymer, Opal B, Freja, Rigel, Maja, Selecta, Balder and Kenia gave 4020, 3950, 3830, 3770, 3760, 3600, 3470 and 3330 kg. per ha. respectively. A new line Sv 43/67, from Peragis x Maja, yielding 3980 kg. per ha., showed good malting qualities in laboratory tests; it is regarded as particularly promising. In crosses between different land barley lines and Maja or Kenia, great difficulty was experienced in achieving a good combination with stiff enough straw. Several X-ray mutants of Gull and Maja have, however, extremely stiff straw and one mutant was also of interest because of its earliness.
In the six-rowed barley trials, lines from Primus x Asplund and Juli x Asplund gave considerably higher yields than the standard Brio, i.e., 3710–4280 kg. per ha. as compared with 3610 for Brio. One naked, six-rowed line had a protein content of 16·7%.
Autumn barley sowings did well and no cold damage occurred. Rumanian land barley gave the highest yield, 6100 kg. per ha. Of the Svalöf varieties, Sv 38/14 b_8, from Mansholt x Pommerskt Nordland, yielded 5750 kg. as compared with the standard varieties Fimbul and Mansholt which gave 5440 and 5470 kg. per ha. respectively.

Herbage plants
Investigations were carried out in collaboration with various bodies, on flowering, fertilization and seed setting in red clover. Samples were also taken of various herbage plants at different stages of development for carotene analysis.
The comparative trial of meadow plants, laid down in 1945, included some tetraploid red clover strains which show remarkably good development and vigour as compared with the diploid strains, but all the tetraploids proved susceptible to *Pseudopeziza*, but no differences were observed between strains in this respect. Trials are planned to study the persistence and palatability of strains.
Inbreeding and hybridization with red fescue, rye grass and white clover were continued. Selections of *Bromus inermis* have given promising results. This species shows considerable genetic variation, and already it has been possible to isolate types with a good set of seed, and seed that is more easily threshed and better suited to machine sowing than available commercial strains.
The most important herbage plants for light sandy soils, *Bromus inermis*, blue lucerne, yellow lucerne and *Lotus corniculatus*, are to undergo selection on a larger scale at the Ugerup Substation.

Lupin
At Ugerup, two new varieties of blue sweet lupin were multiplied, while new lines from sweet x bitter crosses of both blue and yellow lupin were tested and further selected.

For the first time the effects of X-irradiation were clearly exhibited and this work is being continued, though it is impossible to say yet whether characters of practical value have been produced.

Root crops

As in the previous five-year period, the sugar mangels of the white, green-topped Nova type gave remarkably high yields and surpassed all other Svalöf strains of different root crops. New families of tetraploid fodder beets and also families from a cross between tetraploid fodder and tetraploid sugar beets gave very promising results.

Turnip trials gave valuable information about the resistance of the strains to bacterial infection and club root.

Bolting trials with beets showed a general high prevalence of the defect, but considerable differences existed between strains.

Textile plants

Herkules flax gave 5620 kg. of straw per ha. and 1310 kg. of seed while line 0220 b_2 yielded 7030 kg. of straw, and the new line 015 b_1, 6120 kg. of straw. Line 0302 was remarkable for the stiffness of its straw. The X-ray mutant 0800 from Concurrent again surpassed the parent variety in yield of straw.

Among the linseeds, the highest yields were from Rumanian land flax, the new line 01040 giving 1400 kg. per ha. as compared with 1330 from Renodlat, 1220 from Atlas, and 1150 kg. from Concurrent.

The hemps grew well and the following yields in kg. per hectare were recorded: Schurig, 5820; Sv 403742 (a line from a Moldavian land variety), 6450; a Bologna strain grown at Svalöf since 1938 and now acclimatized by natural selection, 6350; and a markedly hermaphrodite strain of Latvian origin, 4170.

Tobacco

Work has been concentrated on continued selection in the F_3 and F_4 from crosses between Havanna 236 and Judy's Pride or Station Standup Burley, and the Swedish strains Tofta, Per Pers and Fjälkinge. Some German varieties are also under observation for the first time.

Poppy

The breeding objective is an early, high yielding, stiff strawed type with closed capsules when ripe. Some lines from Mahndorfer x Peragis have strong straw which is resistant to breaking at maturity, combined with satisfactory or particularly good yield. The highest yield at Svalöf was 1440 kg. per ha.

Hops

The new strain, No. 85, has given a yield of such good quality that brewers are now showing much more interest in Swedish hops.

Oil plants

The line Sv 01 from Svalöfs Senraps [Svalöf Late Rape] was put on sale in autumn 1945 under the name Svalöfs Senraps B. In the 1945 trials it yielded 8·7% more than the original variety. Among the turnip rapes, pedigree lines from Lembke and Ukrainian turnip rape were remarkable, giving considerably higher yields than the original material.

Kok-saghyz

Material selected on the basis of chemical analyses has been multiplied up and the resulting progeny has shown a higher rubber content than the initial material.

Legumes

Of the culinary varieties of peas Klosterärt gave the highest yield, 3210 kg. per ha., while the new line 03101 yielded 3000 kg. and the standard Torsdags II and line 03023, 2780 and 2700 kg. respectively. Several varieties showed severe shedding, and Concordia and Gyllen suffered pest damage.

The best fodder pea was Parvus, with a yield of 3620 kg. per ha., and line 01080 yielded 3300 kg.

The vetch, 02268, derived from Early French, did relatively well with 2770 kg. per ha. A few new lines from French and English commercial varieties were promising.

Soya bean

X-irradiation to induce mutations is being continued. Already from previous treatments, a few lines have been obtained that are earlier and higher yielding than the parent plants. Material obtained by hybridization has yielded lines much earlier and more productive than any available commercial varieties; the earliest ripen by 11 September.

The Genetics Institute of Lund University

In a trial of different varieties of tetraploid rye, the best tetraploid yielded 18% more grain than ordinary Stål [Steel], but unfortunately the yield of the tetraploid had been affected by pollen from ordinary rye. New crosses between different tetraploid barleys were made. The selected tetraploid hybrid barley has proved superior to the primary tetraploids in germination energy and yield. By interspecific hybridization and colchicine treatment, a series of new polyploid types of oil plants, including Indian mustard, were produced. Work is proceeding to obtain entirely new forms of rape in the same way. Crosses between such new types and those in agriculture seem likely to lead to a considerable increase in yield.

Ultuna Branch Station

Of the varieties undergoing tests and multiplication, the autumn wheat 01392 (from Ergo x Gluten), the black oat 01380 (from 01280 x Extra Klock [Extra Bell]), and the pea 01080 (from Torsdags II x Solo) are regarded as specially promising.

The autumn wheat Sv 01293 b_3 is cited as giving the highest relative yield, with W's Eroica as the next best. Lines from the cross Ergo x Gullen were specially interesting. The selections 01391 and 01392, did well but new lines from them and from the rest of the population were even better and line 01392 was highly promising in yield and strength of straw. The better varieties averaged 75–77 kg.

The autumn ryes, Kungs I and II [King's I and II], gave the highest yields, approximately 1000 kg. per ha. more than the Central Swedish autumn wheats.

The spring wheats Brons and Progress yielded best. Some new U lines gave remarkably high yields.

The black oats 01380 (from 01380 x Extra Klock) showed high yields, as did also the U varieties 01370 to 01372 (from Engelbrekt II x Extra Klock).

The highest yielding barley was Sv 40315 followed closely by Ymer and Freja. Some Ultuna varieties had high yields but straw that was not stiff enough. Two X-ray mutants had good stiff straw. The winter barley Sv 39/16 gave the best crop, 6020 kg. per ha.

The new U strains of lucerne gave the highest yield, 13% higher than Grimm. Vigorous selection for seed production was carried out.

Problems of fertilization and pollination of red clover by bees were studied.

Some new, early Svalöf varieties of potato yielded most.

Sv 01, derived from late rape, was hardier than the parent line.

The best poppy variety Sv 43/25 (from Karls Rödblommiga) yielded 1400 kg. per ha.

The best linseed, a North American variety, gave 2135 kg. per ha.; Atlas came next. The best yielders of the fibre flaxes were Concurrent and Sv 0220, with about 3100 kg. of fibre per ha.

Legume Division

Much F_1 material was planted for the breeding peas in Norrland. The new culinary pea 03023 and the fodder pea 01080, now undergoing multiplication, gave the highest yields, 2465 kg. per ha. and 2590 kg. per ha. respectively, as compared with other commercial varieties. Some lines from Artturi crosses seem specially interesting.

Observations on the course of the flowering period in vetches showed that some new varieties had a much more even flowering period than Förädlad Söt [Improved Sweet]. A line selection from Polish vetch gave the highest yield, 2870 kg. per ha., but, in vetches grown as a mixture, Förädlad Grå [Improved Grey] did best.

Östgöta Branch Station

In a trial at Ullevid, a wheat variety 01293 (from Aring I x Skandia I) surpassed Eroica and Skandia III in yield.

Among the new varieties of spring wheat, Sv 01080 b (from 01015 x Diamant III) and Ög 40/448 (from Fylgia x 0990) were promising, and of the later varieties, Sv 01050 b (from

Blanka x Extra Kolben II) gave the highest yield. A barley line from Peragis x Maja and another from Primus I x Opal surpassed Kenia in yield. Good results were also obtained with two relatively early and very stiff-strawed lines from Kenia x a Småland land barley from Skärsmo.
On bog soil, an Ög line (from Kenia x Skärsmo barley) did best, while among the early Norrland barleys, the line J 131 K (from Vega x Asplund) did best, competing well with Kenia.
The Sol oat is improving each year in strength of straw.
For the first time in 30 years, peas exhibited clear varietal differences in frost resistance. The best fodder peas were a new line from Hero, and Solo followed closely by Sv 01080 and the Finnish variety Artturi. Small vetches yielded less than Förädlad Söt, Förädlad Grå and U 02261, a selection from Polish vetch.
The fodder mangels Rubra II and Nova did best and were not behind Barres Halvlång [Medium Long Barres] in output of dry matter. Ferritslev IX from Hossmo was the best of the Barres series.
Ackersegen and the Svalöf potato selections 39178, 38171 and 39108 proved the most resistant to blight. No. 38171 yielded best among the late varieties, and No. 42083 among the earlies.
Some new blue lucerne selections, e.g., 0602, 0611, 0612 and 0615 from the Ultuna Station, gave very promising results in young and old meadows.
Very high yields in first and second year leys were obtained with red clovers, the local strain Sörby-Okna doing particularly well at Tornby, as compared with other local strains and the bred clovers. In second year leys, only two local strains, Lunnebjörke and Bjärka-Säby, equalled Sörby-Okna in yield, though the latter was surpassed by certain bred strains, e.g., Merkur and Svalöfs Renodlade, at Ullevid, Vadstena, where the local strain Väversunda also did better. Among the new Östgöta selections, Karaby and Carlshof again proved promising at Linköping and Vadstena.
At Hagelstad, some local strains of alsike did well in competition with the improved strains. At Tornby, strain differences were observed in the resistance of this crop to *Sclerotinia Trifoliorum.*
The new timothy variety Omnia did well particularly in first-year leys; in two second-year leys, there was no certain difference between it and the local strains, Rotenberg and Örminge.
The best winter rape, Lembke, gave 3570 kg. of seed per ha. The best poppy variety, a line from Karls Rödblommiga [Karl's Red Flowered], yielded 1610 kg. and the best linseed variety Sv 01040 from Studina, 2310 kg.
Many other local trials were conducted in various places.

Kalmar Branch Station
The highest winter wheat yields were obtained from W's Eroica, Hansa and a sister variety of the latter. Ymer, Freja and K37, 77 ranked first among the barleys with some other varieties bred by the Station, which surpassed Opal by 8%.
At Ölfvingstorp, the Örn oat, with some of the Station's new varieties which had distinguished themselves before, gave the highest yields, and they did even better at Ekerum. Among the linseeds, the varieties 01010 and 01040 did best, yielding 9% more than Svalöfs Renodlat. One line of spring rape from Regina surpassed the rest in yield. Poppies suffered from broken stems, but the varieties showed marked differences in the incidence of this defect. Sunflowers showed great differences in varietal yields.

Västgöta Branch Station
The winter wheat, Sv 01420 (from Skandia II x a line from a land wheat) and a sister variety of Skandia II, Sv 01092, gave the highest grain yields, while Eroica and Skandia III were the best of the commercial wheats.
Of the ryes, Kungs II [King's II] had the stiffest straw. In malting tests, Kungs II and Stål showed less sprouted grains than the other commercial varieties.
The spring wheat Ög 0978 d_2 (from Extra Kolben x Aurore) attained the highest yield, about 10% more than Diamant II, which was also surpassed by Progress and Brons by about 5%. Progress had the stiffest straw.

Intensive work was done with barley. A sister line of Ymer yielded 5760 kg. per ha.
The different groups of oats varied greatly in performance. Lines from Sölv [Silver] x Örn, Sol II x Vg 01471, and Örn x Stjärn, surpassed the Swedish commercial varieties in yield.
Some new vetch selections from an old Västgöta vetch did best, surpassing Förädlad Söt in yield by about 13%.
The red clover, Merkur, did well in second-year leys; though it had proved inferior to local strains in its first year. One Merkur strain raised at the Station on clover sick soil seems to be considerably superior to the original strain. The new Omnia timothy (0812) surpassed older commercial varieties. Svalöfs Sena [Svalöf's Late] was the best of the meadow fescues, and Victoria did best of the ryegrass varieties.
The Morsö strain of white clover from Skultuna gave the best yield both alone and in mixture.
The X-irradiated Regina was the most productive spring rape, giving 1730 kg. of seed per ha. The best white mustard was Sv 44/160, from Svalöf's White mustard, with 2470 kg.; the best poppy variety, Svalöfs 44/31, from Moravian Blue, with 1330 kg.; and the best linseed Svalöfs 01040, from Studina, with 2130 kg. per ha. The fibre flax Sv 0240, from Herkules x 060, had the highest output of fibre, about 20% more than the Herkules lines.
The fodder sugar beet Svalöfs Nova showed the highest production of roots, while Nova and Milka were equal in yield of dry matter.
The Ferritslev strain of the Barres fodder beet gave the highest yield of roots and dry matter, while the largest crop of roots from the Bangholm type of swede was recorded for Hammenhögs Bangholm, and from the Gul Svensk [Yellow Swedish] type, for Balder. The Göta swede as usual showed a high total yield, but was too low in dry matter content.

Värmland Branch Station
Lines from Ergo x Gluten and Vg 01312 gave over 5000 kg. of grain per ha. in spite of drought.
The oat Sv 35/449 surpassed Guldregn at most substations, as did also Vrm 01466 in various localities.
The potato Sv 42096 yielded 39% more than Early Puritan, while the medium late Up-to-date was surpassed by Sv 38171 by 20%, and by Sv 39153 by 23%.

Västernorrland Branch Station
The only barleys that did not suffer severely from lodging were Edda and two lines derived from it. The two wheat lines U 01303 and U 01392, both from the cross Ergo x Gluten, surpassed Thule II and Ergo, U 01393 yielding 4500 kg. per ha.
The very early Finnish spring wheat, Pika II and the later variety Kimmo ranked first in yield with about 2900 kg. A new variety bred by the Station almost equalled Pika II in earliness, but not in yield.
Clear differences in straw strength were observed in oats. The standard variety, Same, surpassed all the commercial oats, in most cases by 10%. Only one variety Å 41/413, gave a 10% higher yield than Same, which averaged 3730 kg. per ha.
A barley obtained from X-irradiating Gull had exceptionally good straw.
Edda, which averaged 3900 kg. per ha. in four trials was superior to nearly all the other barleys. One two-rowed variety, Å 38/230, gave good yields in several years. In an X-irradiation experiment with Maja, the parent line produced 4500 kg. of mature, well-developed grain per ha.
Of the grey pea varieties, the new variety Vesta gave the highest yield. Torsdags II was the best yellow pea.

Umeå Substation
The very early barley J 161 K surpassed Edda in yield. The oat Å 01390 gave nearly 4% more than Same. The pea varieties Vesta and Å 05323 ranked first, exceeding Bottnia in yield by about 30%.

Stenfors Substation
One white oat, Å 33/79, gave a 20% bigger crop than Same. The Vesta pea surpassed Bottnia in yield by nearly 20%.
Toivo was the best rye, yielding 4900 kg. of grain.

Malgomaj Substation
Björn rye did best with 3400 kg. of grain per ha.

Jämtland Branch Station
Work was concentrated on the breeding of barley and meadow plants.
Winter rye was severely damaged by the weather, but Björn and new lines from the Västernorrland and Övre-Norrland Stations did not suffer so severely.

Övre-Norrland Branch Station
Damage by *Fusarium* was observed only on southern Swedish ryes and on some rye hybrids from crosses with southern Swedish varieties. The new rye bred by the Station gave the highest yield, 2870 kg. per ha.
Preliminary trials with barley mutants from material that had been X-irradiated at the Station were begun.

618. TEDIN, O. 575:633(48.5)
Till odling i stort under perioden 1936–1946 erbjudna svalöfssorter. (**Svalöf varieties released for large scale cultivation during 1936–1946**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 381–94.
The list follows the lines of that drawn up in 1936. Only varieties put on the market are included. For each variety, the origin is given, where possible, as well as characteristics of special importance. The crops enumerated are autumn wheat and rye, spring wheat, white and black oats, barley, vetches, peas, potatoes, clovers, timothy, meadow grasses, root crops, spring rape, flax and lupin.

619. 575:633(48.5)
WEIBULL, W. 575.1:633(48.5)
Till vårt lands jordbrukare och trädgårdsodlare. (**To our country's farmers and market gardeners**).
Weibulls Ill. Årsb. 1946 : **41** : 2–3.
An introductory note is presented, dealing with past and present work done at Weibullsholm in the production of new crops by breeding, and with advances in Sweden in genetical studies of practical value to farmers and horticulturists.
Abstracts of the accounts of the work on various crops are contained in the present issue of *Plant Breeding Abstracts*.

620. FRANDSEN, H. N. 575:633(48.9)
D.L.F.s og F.D.B.s Foraedlings-virksomhed. (**Breeding work by the Danish Farmers' Co-operative Association for Seed Growing and by the Co-operative Wholesale Society of Denmark**).
Tidsskr. Frøavl. 1943 : No. 377 : 394–404; 1944 : No. 379 : 436–40.
The early and subsequent development of the plant breeding work of the above two bodies is outlined, and evidence of their progress and successes during the 44 years since plant breeding by the Co-operative Wholesale Society of Denmark began at Lyngby, is demonstrated by the production of 60 approved original strains, 40 of which have come into use since. Some of the more important varieties and strains here mentioned and described include:—

Wheat
Two wheats, Øtofte L3 and Øtofte L 103, undergoing trials are very hardy and also give good yields in mild winters, the relative figures for their grain yields in 1943 being respectively 103 and 104 as compared with 106 for Pajberg Ideal, and Weibulls Eroica, and 100 for Svalöf Skandia II.

Grasses
In work on grasses a new, late form of *Festuca pratensis* which is very hardy and therefore suitable for inferior soils has been produced. The Roskilde Station has also developed an outstanding strain of *F. rubra* which has however not yet been tested in the official trials.

Birdsfoot trefoil

The Roskilde strain has done remarkably well in yield trials in 1937–38 and 1940–41 and also in seed production trials in 1937–38, having surpassed French commercial seed in both tests.

At Ötoftegaard hybridization has been carried out with wild Danish birdsfoot trefoil and more reliable forms in regard to seed production have been obtained, but the yield is still too low.

Lucerne

In spite of some criticism, work with lucerne has been in progress since 1918, and a new strain has now been produced. The problems of seed production are being studied with success and in 1940–41 seed production trials with 95 families in which the Øtofte strain yielded 501 kg. of seed, were in progress at Ötoftegaard. On the other hand, in 1942 no seed was raised, but the writer believes it is possible to discover forms which will give a more or less normal yield of seed in Denmark.

Experiments in 1940–41 and 1942–43 at Ötoftegaard and Roskilde have indicated the existence of types of lucerne differing in their reaction to the lime content of the soil. The Otofte strain surpassed Grimm (Canadian) at both experiment centres, but the excess yield was considerably higher at Øtofte where the soil is rich in calcium. Similar evidence of differential reaction to the environment in this case affecting yield of dry matter was obtained from trials with 36 families: here the two with the lowest dry matter yield being hybrids between common lucerne and *Medicago falcata*. Efforts should be continued to obtain forms not so exacting in regard to lime.

Clovers

Tidlig Øtofte [Early Øtofte], Sildig Øtofte [Late Øtofte] and Halvsildig Øtofte [Semi-late Otofte] are described. The last is a vigorous, early "late clover" with good recovery capacity and persistence and produces a good quantity of seed. Its one defect is susceptibility to *Sclerotinia Trifoliorum*. Two new selections from it, Halvsildig Øtofte I and an even more recent élite, are at present undergoing official trials in which it is claimed to be holding its own among the best. Yet another selection, though not yet in the official tests, has yielded 7% or 10 hkg. more dry matter than the old variety and also seems more resistant to *Sclerotinia*.

Recent work on varietal resistance to *Sclerotinia* has shown Halvsildig Øtofte to be more susceptible than Tidlig Øtofte and it appears likely that more resistant forms could be developed, even if immune strains are impossible to obtain. The problem is complicated by the existence of strains of the fungus differing in virulence.

White clovers include (1) the Morsø Øtofte selection obtained in 1924–25 which has given very high yields in the government trials, though not equal to the old Morsø type in seed production; (2) the Otofte strain which gives a good yield of seed and is even more persistent than Morsø Øtofte but inferior to it in yield.

Over 72 families of white clover are undergoing trials.

Root crops

Since 1917 about 25 varieties and strains of root crops have been produced including the strains Barres Otofte IX and Tystofte Otofte IX as well as a new Barres élite of similar origin to the above two but with a still higher dry matter content. In 1943, 35 families were tested with Otofte IX as standard and their average yield showed a further increase (107 : 100) in content and yield of dry matter. The root shape has become slightly slenderer and longer, but still retains the desirable smoothness and contour of Barres.

In 1927–28 crosses were begun between the Barres beets using Tystofte Otofte and Taarøje Otofte and the sugar beets, Klein Wanzleben and Tystofte 201 ultimately called Tystofte VII. Three strains resulted: Hvid Øtofte [White Øtofte], Gul Øtofte [Yellow Øtofte] and Rod Otofte [Red Øtofte]. The first two have been on the market for some years and have given general satisfaction. The third, Rød Øtofte, is not yet quite constant in colour, but is undergoing official preliminary trials and will probably be included in further strain trials.

Swedes

An account is given of past and present developments in swede breeding in Denmark under the direction of the two above mentioned co-operative bodies, including a description of the origin and performance of the variety Wilhelmsburger Ötofte VIII C which is remarkable for its record of resistance to aphid attack, to dry rot and to finger-and-toe.

Work with Wilhelmburger strains is still going on; though not equal to the Bangholm forms in good swede years, they are more reliable in bad years for swede growing.

Hybridization has not been neglected and three varieties, Wilhelmsburger Ötofte, Bangholm Øtofte and (Bangholm) Wilby Øtofte have been obtained which are still being tested for yields and the content and yield of dry matter.

Recently Wilhelmsburger has been crossed with other strains, such as Bangholm Studstofte, Bangholm Herning and the white-fleshed Kaemperød 'Giant Red', in order to increase its yield and its resistance to finger-and-toe. No less than 120 families are being tested on healthy and infected soils.

Flax

Flax has recently been included in the research programme at St. Lundgaard where the soil and conditions are suitable. Work on linseed has included the testing of 48 lines with the German strain Roland. The latter has given 1846 kg. of seed per ha. and 3236 kg. of straw, and the corresponding averages for the 12 best lines were 2325 and 3382. The highest yield obtained was 2475 kg. per ha. of seed and 3844 of straw.

Poppy

Used in rotation, this oil crop has been very productive, the yields of seed being 1365 kg. per ha. in 1942 and 1500 kg. per ha. in 1943.

In conclusion an analysis is given showing the value of the breeding work recorded in raising agricultural output in Denmark (cf. Abst. 800).

Legumes

The production of a new fodder pea, Marmor Øtofte, and a new horse bean is recorded. Marmor Øtofte is a selection from Abed Marmor and, in 1942 in eight trials run by the Agricultural Associations it yielded about 200 kg. per ha. more seed than the original Marmor. It is to be released this year.

621. HANSEN, H. H. H. 575:633(48.9)
Lokale Forsøg og andre Planteavlsarbejder. (**Local trials and other work on plant breeding**).
Beretn. Planteavl. Lolland-Falster 1942 : 17–86.

A brief outline of the clover, wheat and rye trials carried out in various localities in Denmark during 1942 is amplified by (1) tables showing localities, aims and results, and (2) a detailed survey of the results (cf. Abst. 620).

622. BRAAK. 575:633(49.2)
Iets over de bloembiologie van enkele tuinbouwgewassen in verband met de mogelijkheid bij kunstmatige bestuiving van insekten gebruik te maken. (**On the biology of the flowers of some horticultural crops in relation to the possibility of using insects to effect artificial pollination**).
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 2nd Mtg 23 February, 1944 Wageningen No. 44 3 : 9–12. (Mimeographed).

Flies have been successfully used to pollinate onions by Jones and Emsweller, and possess certain qualities that fit them for this work. Crops like carrot and beet are better suited to fly pollination than onions and therefore are suitable crops to use for experiments on artificial fly pollination. The floral structure of the following plants suggests that they may be suitable for fly pollination: cabbage, kohlrabi, turnip, radish, rhubarb, salsify (*Scorzonera*), artichoke, lettuce, endive and chicory.

Bees and bumble bees should only be used when flies are not successful, e.g. for Papilionaceae and Labiatae. The two most important horticultural crops concerned are peas and beans, which have become adapted to self-pollination, so that insect pollination is not so necessary.

In the discussion the possibility of fly pollination of carrots and crucifers was mentioned; also the fact that hoverflies might be better pollinators; but it is doubtful if the latter could function in a closed space.
Nijdam recounted his experiences with red clover and bumble bees which he freed from foreign pollen by placing them in a cage with *Phacelia*. Later, when put into a cage with clover, they did not feel at home and speedily died. Only one survived for a fortnight, waiting for each flower to open. Unlike other workers, Nijdam got no results in this way and now has resorted to artificial pollination with the aid of filter paper.
Braak said that bumble bees can be freed from pollen by dipping in water and shaking them. But Minderhard prefered a fine spray of water to avoid the air bubbles that are trapped in dipping the insects. Furthermore he stated that bees cannot be freed of pollen by using of a cage with *Phacelia*, and he asked if Nijdam's solitary bee was a male, as the workers are less suitable. Moreover it is necessary to provide food, e.g. a piece of comb and honey, to prevent starvation. *Bombus agrorum* is the easiest to keep alive. The theory that they see the same colours as men must be used with caution. Contamination of pollen in the hive, e.g. by pollen previously collected by another bee from a different source is most unusual. The pollen clusters consist almost entirely of one kind of pollen. Anyhow, it can be prevented by putting plots so far apart that the bees from one hive can visit only one plot.
Boonstra remarked that sugar beet is not so self-sterile as is usually supposed, as he had got a considerable amount of seed from beet enclosed in cheese cloth cages. Wellensiek claimed that this form of isolation was ineffective as the beet pollen can pass through cheese cloth. A case of hybridization despite a double wall of this material was mentioned by Banga. Paper is the best material for isolating.
In order to throw light on Nijdam's negative results Vervelde presented some of Mayer's data on the pollination of the clover by bumble bees. These data support the statement that most of the bees die the first day, but they provide evidence that many pollinations are effected. Thus in 1943, with some 500 bumble bees working in six isolation cages, each containing two plants, on the average 580 seeds were obtained from each cage, with a maximum of 440. The chief reason for the rapid mortality seems to be lack of food. During the period of full bloom they survive longer.

C. B.

623. 575:633(49.2)
635.34–2.111–1.521.6:575.42(49.2)
635.34:575.2

HAAN, DE

Bepaalde rassen kunnen veelvormig zijn voor eigenschappen, waarop te voren niet werd geselecteerd. (**Certain varieties can be polymorphic for characters for which they were not previously selected**).
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 2nd Mtg 23 February, 1944 Wageningen No. 44/3 : 12–13. (Mimeographed).

The hard winters provided an opportunity for the Dutch Plant Breeding Institute to carry out two experiments on cabbage seed; to wit the selection of summer and winter hardy types.
Mansholt seed was uniform; the plants had stalks about 16 inches long and there were no bolters. Lembkes seed on the other hand was not uniform for length of stalk; some were shorter and some longer, while in the late summer some flowered. Janetzki seed was at first uniform, giving very short plants, but in the summer some 15% flowered.
Selection for winter hardiness is based on the supposition that short stalked plants at harvest in the autumn are more winter hardy than the long stalked.
Wellensiek remarked that hidden polymorphism only occurs in cross-pollinating plants. Vervelde remarked that, despite 50 years of cultivation, Petkus winter rye still provides summer types. Wellensiek remarked on the apparent contradiction that although Mansholt cabbage seed is the least winter hardy, no summer types can be selected from it, in contrast to Lembke and Janetzki which are winter hardy.
Dorst pointed out how important for the Variety List such hidden differences are, and gave as an example a selection out of a population obtained by crossing Kenia with Kr 288.

Under normal cultivation on clay this did not differ from Kenia, but when grown on sand and also with very wide spacing, obvious differences appeared. Similar phenomena occur with diseases, and the *Croton* variety Kogel which showed leaf spots due to disease in a certain year. C. B.

624. 575:633(49.4)

Station fédérale d'essais viticoles, arboricoles et de chimie agricole, à Lausanne et à Pully. Rapport d'activité 1945. (**Federal station of experiments in viticulture, arboriculture and agricultural chemistry at Lausanne and Pully. Annual report 1945**).
Landw. Jb. Schweiz 1946 : **60** : 741–880.

Apple
Plants resulting from the 1943 crosses are being tested. Trials of different varieties as stocks are reported. Fruits of different varieties are being submitted to conservation tests.

Pear
Hybrids made in 1939 have fruited and their fruits have been tested for keeping capacity.

Apricot
Crosses have been made with the object of developing an apricot variety with fruit quality equal to Luiset and earlier flowering or more tolerant of low temperatures.

Cherry
Hybridizations have been effected.

Vine
Comparative tests of the unfermented juice of different hybrids are reported.
It has been shown that the percentage of germinable pollen and the average length of the pollen tubes are strongly influenced by temperature and sugar concentration.
Vine hybridizations have been carried out with the aim of producing early varieties to replace Chasselas in areas where its performance is unsatisfactory.
Observations are recorded concerning the value of various hybrid stocks.
Performance data relating to European and American varieties cultivated for the production of dessert grapes are presented.
Bicane, Vorosmarthy, Black Alicante and Pirovano II are reported to be good dessert varieties for keeping.

Vegetables
The effects of disinfecting the seeds on the yield of different varieties of carrots, kidney beans, tomatoes and lettuce are tabulated.

625. 575:633(54)

Progress Report of the Institute of Plant Industry, Indore, Central India, for the year ending 31st May, 1946 : Pp. 35.

Cereals
Several bread and durum wheat varieties have been multiplied for distribution. P.B.I. gave the highest yield in a variety trial, and is one of the best strains tested; it is a red grain type. Another variety trial comprising six *T. vulgare* strains and three *T. durum* strains was carried out both as a barani trial and under irrigation. F16, a yellow grained wheat, is now multiplied and distributed. In agronomical trials Hyd. 557–10 gave a relatively high yield on rich soil. Further trials were conducted in some of the states.
Varietal tests of maize are reported. In a randomized replicated test at Udaipur the yield of grain from Jaunpur yellow was significantly the highest.
Indore No. 3, a double purpose strain of jowar for grain and fodder, and No. 9, a grain jowar, have been multiplied for distribution. Variety trials revealed significant differences between varieties.

Cotton
Breeding work is directed towards improving the yield, quality and disease resistance of desi cotton (*G. arboreum* var. *neglectum* f. *bengalensis*). The results of varietal trials are reported. In order to improve lint length of Bhoj cotton several crosses and back-crosses were made between Jarila and Bhoj and their progenies. Although the analysis of the

data is incomplete as yet, the material appears to contain several good progenies which are better than either of the controls, Jarila and Bhoj. Notes are included on the varieties Buri 107, Cambodia Indore No. 1, Jarila, Malvi 9 and Bhoj (Dhar 43).

Sugar cane
Several varieties are being multiplied.

Tobacco
Among the four varieties grown, I.P. 58 has given the best results over a number of years.

Capsicum
C9 has proved to be the best of the several varieties tested.

Linseed
Four selections are to be distributed. Work on the production of a wilt resistant strain is still in progress. Variety trials are reported.

Groundnut
Ak. 12–24, an early high yielding, erect bunch type, with small nuts, and Ak. 8–11 a later maturing, erect bunch type with larger nuts, have been multiplied and distributed. Variety trials at Nowgong and Ajaigarh are reported.

Pulses
The genetic variability of local samples of *Cajanus indicus* and *Cicer* is being studied. Variety trials are reported. Two *Cajanus* selections and four *Cicer* varieties have been multiplied for distribution.
The pea variety Khaperkheda, which bears fair-sized pods with sweet seeds, shows promise of becoming a standard variety.
Ototan, a black-seeded fodder variety of soya bean, and Easy Cook, a yellow-seeded variety with large seeds and used for human consumption, have been multiplied for distribution.
The programme of work for 1946–47 is outlined.

626. SENEVIRATNE, L. J. DE S. 575:633(54.8)
Administration report of the Acting Director of Agriculture for 1945.
Part IV—Education, science, and art. (D). Ceylon 1946 : Pp. D 39.

Pyrethrum
Clones have been selected on the basis of flower number and size. Strains rich in pyrethrin will be isolated within these clones.

Millets
The Jamnagar-Giant Cumbu selection, PT 7, was released. Selection work was continued with tanahal (*Setaria italica*) and *Panicum miliaceum*.

Rice
Pure line selections of the local varieties, Rathkarayal, Sinnanayan, Murunga and Dahanala, are being tested against unselected local material, and other unselected lines of local origin are under observation prior to selection work. Long-term varieties have also been tested and have given promising results. Kagga, Bile Kagga and Pokkali were outstanding among the varieties which tolerate saline soils, seven of which are being tested for reaction to soil salinity.
The abnormal and adverse weather conditions experienced in both seasons interfered with rice trials and vitiated some of the results at several centres. Performance data are recorded for several varieties and selections tested at different centres.
Stem-borer trials appear to confirm previous observations that the new Dahanala selections are to some degree resistant to attack.
Fourteen hybrids are under observation, and desirable types are being stabilized for age classes. Laddong Mori has been crossed with Vellai Illankalayan (28061) in order to evolve a four-month non-lodging strain.
Fifty-one Burma varieties and 13 Coimbatore varieties were added to the 80 other foreign varieties under observation. Some have been included in trials with local pure line

selections. Three varieties are being tested at Tabbowa for reaction to cultural treatments and manures.

Cotton
Tests indicate that selection BP 79 is suitable for spinning up to 41s. It yields over 7 cwt of seed cotton per acre and has a staple of over 1 inches.
A Cotton Breeding Station of ten acres was opened at Hambantota for the maintenance of 14 medium staple cottons, now acclimatized over a period of six years. The morphology of the varieties is being studied and a programme of breeding, and cultural and manurial experiments is being planned.

Kapok
Selected clones have been established at Nalanda.

Cassava
The superiority of vertical planting of cuttings was established for seven varieties included in a yield test.

Sugar Cane
Varietal trials are reported.

Tobacco
Variety trials at several stations are reported to be in progress. Seeds of foreign varieties have been imported for trial.

Plantain
It is anticipated that the monographing of Ceylon varieties will be completed in 1947.

Chilli
A quasifactorial trial of 81 Tuticorin chilli progenies was established at Tabbowa in the maha season.

Cinchona
Further plantings have been carried out, and trials have been laid down to determine the effects of various cultural treatments on cinchona.

Rubber
The local clones MK 3/2 and Wagga 6278 can now be classed with TJ. 1, and G.L. 1 and PB 86 and recommended for large-scale commercial planting in Ceylon. The study of local and foreign clones was continued and yield data collated and published.
In an extensive breeding programme, about 37,000 hand pollinations were effected, 14% of which were successful. From the best of these crosses, new clones will be selected and tested at Hedigalla.

Citrus
The performance of varieties at different demonstration orchards is described. Stock-scion trials are reported.

Bread-fruit
Stock-scion trials are reported.

Guava
The seedless guava failed to set fruit except in proximity to a seed-producing variety. The fruit setting was attributed to the stimulus of pollination by viable pollen.

Mango
Stock-scion trials are reported. The Neelam mango bore prolifically at Peradeniya and Jaffna. The fruits which came into season later than those of other varieties remained in good condition long after picking; the flesh was firm and of excellent flavour.

Avocado
Varieties were found to vary in respect of their protein content, the variety Gottfried being superior to the rest. This variety flowered a month earlier and St Anne a month later than Peuble and Pollock, both of which flowered in early February.
Stock-scion trials are reported.

Rambuttan
The Malayan rambuttan exhibited scion overgrowth on the sour rambuttan. In both the red and yellow fruited Malayan varieties the sweet, crisp flesh peeled readily from the seed coat.

Vegetables
Good results were achieved in seed production of temperate vegetables. Cabbages grown from seed raised at the station produced hard, fine-flavoured heads.
Selections of indigenous vegetables were planted out for seed production.
Variety trials of garlic are reported.

627. 575:633(56.9)
Annual report of the Department of Agriculture and Fisheries Palestine for the year 1945–1946 (1947) : No. 10 : Pp. 48.

Cereals
It is mentioned that wheat and barley breeding work has been continued.

Tree fruits
Investigations of the resistance of local fruit stocks to nematode are in progress at the Acre station.
Varieties of local quince stocks are under test for resistance to lime chlorosis at Sarafand.
Various investigations on rootstocks in *Citrus* are briefly reported.
Self-fertility and self-sterility in the olive are being studied at the Farwana and Farradiya stations.

Grapes
In tests of stocks for nematode resistance, Solonis Othello 1613 and Solonis Riparia 1616 proved most resistant.
Further trials are being carried out in Kinneret with a view to finding suitable early varieties in addition to Queen of the Vineyards and Pearl of Czaba; late varieties are under test at Manarah.

Vegetables
Onion, cauliflower and tomato breeding continues.

28. MENKES, I. 575:633(56.9)
(Field crops in the experimental plots of the Seed Growers' Association).
Hassadeh 1947 : **27** : 364–66.
A report on the activities of the central farm of the Seed Growers' Association is presented. Field trials were carried out with six wheat varieties, five barley varieties and five oat varieties. Selection work was carried out with vetches, corn, sunflower and durra.
C. O.

629. GREENWOOD, M. 575:633(66.9)
Report on a visit to Nigeria November–December 1945.
Gov. of Nigeria and Gold Coast. Pp. 48.
The report contains a review of various investigations, including breeding, carried out in Nigeria on the oil palm, cacao, cassava and other crops.

630. 575:633(68.9)
Annual Report of the Department of Agriculture, Northern Rhodesia for the year 1946 (1947) : Pp. 16.

Wheat
Work is at present limited to the trial and distribution of introduced pure lines.

Kaffir corn
Selection is reported.

Rice
Trials are being carried out in the Western Province to find a type suitable for cultivation at relatively high altitudes; the Pemba strain again gave a satisfactory performance.

Cassava
The varieties C4, P7, K1 and Wallace show promise at Lunzuwa in the Northern Province; they are resistant to mosaic.

Tobacco
Introduced varieties such as Bonanza, White Stem Orinoco and Yellow Mammoth are under trial at the Msekera Tobacco Station.

Cowpea
Varietal collection and trials have been begun at the Magoye Station, Southern Province.

631. ARNOLD, H. C. 575:633(68.9)
Agricultural Experimental Station, Salisbury.
Annual Report of Experiments, Season 1945/46.
Rhod. Agric. J. 1947 : 44 : 306–26.

Maize
Progress in the development of hybrid maize is reported. The N group of inbred strains are particularly valuable. The supply of suitable inbred strains is being increased with a view to producing double hybrid seed for distribution to the farmers in the near future.

Crotalaria juncea
No suitable substitute for sunn hemp has been found. This plant is valuable as a green manure crop, but over wide areas of Southern Rhodesia its cultivation has become impossible on an account of beetle attack. In the circumstances an attempt is being made to select superior strains of sunn hemp.

Velvet bean
Crosses were made between the Jubilack velvet bean and another variety, with a view to producing a velvet bean strain which will yield as much fodder as Jubilack and also a consistently larger amount of seed; promising selections are under trial.
Single plant selection has also been made within Jubilack; strain No. 74 has proved to be the best selection and is being increased for distribution.

Cowpea
The Turiani and New Era varieties were crossed with strains possessing the upright habit which were received from Potchefstroom. Hybrids S.E.S.D.3 and S.E.S.G.4 were obtained as a result of this breeding work, and are being propagated for distribution. Both hybrids are semi-upright, small-seeded, "blight" resistant types. S.E.S.D.3 gives a heavy yield of both fodder and seed. S.E.S.G.4 produces greater yields of fodder than S.E.S.D.3 but somewhat less seed; the combined seed and fodder yield of S.E.S.G.4 is higher than that of S.E.S.D.3.

Soya bean
Trials of strains derived from crosses between a number of Hernon strains and Potchefstroom No. 184 were continued. A number of strains outyielded the standard variety, Hernon No. 107.

632. 575:633(71)
The Dominion Experimental Farms.
Minist. Agric. Ottawa 1947 : Pp. 53.
A useful concise account is given of the work of the Dominion Experimental Farms of Canada, including plant breeding investigations. The plant breeding work has been summarized in the abstracts of the annual reports of the Minister of Agriculture for the Dominion of Canada.

633. 575:633(73)
A visitor's booklet.
U.S. Dep. Agric., Agric. Res. Admin.; Bur. Pl. Indust., Soils, Agric. Engin. Beltsville, Md 1947 : Pp. 13 : (Mimeographed).
This publication, intended for visitors to the Plant Industry Station, Beltsville, Maryland, presents a simple account of the crop breeding and other investigations carried out at the Station.

634. PINTO, E. DE SOUSA LEÃO 575:633(73)
Estágio nos E. U. Da America do Norte. **(Visit to the United States of America).**
Bol. Sec. Agric., Pernambuco 1945 : **12** : 247–70.
In this description of a visit paid by the author to various agricultural research institutes in the U.S.A., an account is given of the plant and animal breeding work and other projects being carried out at Beltsville, Md.

635. 575:633(74.3)
Report of the College of Agriculture, University of Vermont, July, 1945—June, 1946 : No. 2 : Pp. 44.

Forage legumes
Polyploids of Ladino clover induced by treatment with colchicine are under investigation. A modified form of the Myers-Hill cold shock technique has been used in the study of the chromosome numbers of legumes with high polyploid numbers, including naturally occurring species and synthetic strains of *Trifolium.*

Blueberry
Breeding work has been begun. A collection of seedlings and named varieties has been planted. Crosses have been made between a number of varieties and a highbush blueberry native to Vermont.

Strawberry
Hybridization work is in progress.

Tomato
Breeding work is mentioned.

636. 575:633(74.8)
Science for the farmer.
60th Rep. Pa Agric. Exp. Sta. 1947 : Bull. No. 488 : Pp. 57.
In addition to the investigations summarized below, varietal or strain tests of wheat, oats, barley, red clover, blight immune potatoes, tobacco and soya bean are briefly reported.

Lettuce
The new Early Great Lakes and Pennlake varieties have been entered for the 1947 All-America Trials.
The selection Pennlake 78 shows tip burn resistance. Selection Pennlake 86 resembles Pennlake 73 now in commercial use but is earlier.

Tomato
The F_1 hybrid Rutgers x Pritchard has been named Keystone State Hybrid, but the seed is not generally available. It is a tomato suitable for canning and has outyielded the standard variety Rutgers by an average yield of 4·7 tons per acre.

Sweet corn
The new yellow inbreds S3–61 and S2–70 have been released; they are both of Golden Bantam descent. The new hybrids 5S–14 and 5S–2 have also been released. Hybrid 5S–14, produced from a cross between P51 and S2–70, has grain particularly suitable for freezing.

637. 575:633(75.6)
Research and farming.
69th Rep. N.C. Agric. Exp. Sta. 1946 : **5** : Pp. 135.

Wheat
Leaf rust resistant selections of the cross Frondoso x (Redhart x Nóll) show particular promise as regards high yielding capacity and stiffness of straw.

Oats
The new Lemont oats (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1518) is highly resistant to mosaic. It is resistant to one race of smut but susceptible to crown rust. In winter hardiness Lemont is satisfactory. The variety has the disadvantage of a tendency to lodge.

Maize
The new white hybrid T5109 is to be jointly released by the Tennessee and North Carolina Agricultural Experiment Stations.

Barley
As a result of breeding work on combined resistance to loose smut, mildew and leaf rust, a promising resistant selection, designated No. 2989, has been obtained from the cross Sunrise x Davidson.

Dallis grass
A study has been made of the following strains of Dallis grass: the commercial strain known as common Dallis grass; a leafy strain from Tifton, Georgia, poor in seed production; a yellow anthered upright type from Uruguay, which is a good seed producer but possesses a stemmy unproductive vegetative growth; and a leafy creeping strain from Uruguay. Evidence has been obtained from twin seedlings and experiments on pollination that the seed of Dallis grass is mainly asexual in origin.

Cotton
F_1 hybrids between lines of Coker 100 and 200 produced higher yields of seed cotton and more bolls than the average of their respective parents in 11 of the 28 combinations studied; four of the hybrids produced higher yields and more bolls than the better parent.
Back-crosses of crosses between Upland cotton and *Gossypium Thurberi* to Upland cotton have shown fibre strengths up to 75% higher than the strength of Upland cotton; it has not however been found possible to combine this increased fibre strength with high yielding capacity.
It is suggested that in selection, use of an index based upon number of bolls per plant, number of seeds per boll and lint per seed is more effective than the use of the actual yield as the sole criterion in selection.

Tobacco
The performance of Turkish tobaccos is under investigation in western North Carolina.
Flue-cured lines have exhibited promising resistance to *Fusarium* wilt, and have produced average yields of high quality tobacco.
Oxford 26 has shown marked resistance to *Fusarium* wilt.

Peanut
Intervarietal hybrids are under investigation. The wild species from South America show promise as useful breeding material. These wild species have been successfully crossed with cultivated varieties. The embryos obtained as the result of interspecific hybridization, however, remain under-developed; work is in progress to overcome this difficulty.

Soya Bean
Hybrid selections possessing Ogden as one parent show promise; in yield they are similar to Ogden but possess improvements in resistance to shattering and in seed quality.
A powdery mildew disease occurring on soya beans in North Carolina has been identified as belonging to the genus *Microsphaera*; Roanoke, Volstate, Haberlandt and Wood's Yellow are highly resistant to the disease.

638. 575:633(75.8)
Twenty-sixth Annual Report Georgia Coastal Plain Experiment Station, Tifton, Georgia 1945–1946 (1946) : Bull. No. 43 : Pp. 56.

Maize
Hybrid production is in progress.
Inbred lines were tested for their reaction to nematode (*Heterodera marioni*); NC16 was the only inbred showing any appreciable resistance. Further material is to be tested.

Forage grasses
Breeding and selection were continued in Bermuda grass, Sudan grass, Dallis grass, Bahia grass and cattail millet.
Coastal Bermuda continued to give a good performance (cf. Abst. 243).
Progress has been made in the development of cold resistant Bahia grass hybrids.

Breeding work on Sudan grass aims at combining the disease resistance of Tift Sudan and the desirable characters of Sweet Sudan.

Kudzu
Widely varying types have been collected; selection is in progress to secure types suitable for breeding.

Sweet potato
Breeding work has been begun to produce a table variety with resistance to stem rot and improved quality, and also a variety suitable as livestock feed.

Cotton
Upland cotton breeding is reported. The new wilt resistant variety Pandora is being increased for distribution. It has been developed from an F_3 selection of a cross between Station 21 and Station C. It is superior in yielding ability, earliness and fibre strength. In breeding work attempting to improve the picking quality and lint percentage of Sea Island cotton, promising Egyptian x Sea Island hybrids have been obtained.

Groundnut
A large number of hybrid strains are under investigation.

639. 575:633(76.2)

Highlights of the work of the Mississippi Experiment Station.
59th Rep. Miss. Agric. Exp. Sta. 1946 : Pp. 51.

Cereals
Oats and barley breeding are in progress.
The new wheat hybrids, Hybrid 45–21 (C.I. 12463) and Hybrid 45–24 (C.I. 12464), have given a promising performance in the Delta region.

Forage crops
Johnson grass selections exhibit considerable differences in plant type, self-fertility and susceptibility to disease.
The F_2 progeny of the cross Hodo sorghum x Johnson grass tend to be of the same height as the sorghum parent; in type of head they resemble Johnson grass.
F_6 selections of the cross Johnson grass x Honey sorghum combine large stalks and a short rhizome. The selections lodge less than sorghum.
Interspecific hybrids of *Paspalum* are under investigation.
Hard-seeded selections of crimson clover are being increased.
An attempt is being made to develop a strain of kudzu resistant to bacterial halo blight. In artificial inoculation tests some lines have proved resistant.

Potato
Resistance to southern stem blight is receiving attention.

Sweet Potato
Tests were carried out on 25 varieties. None exceeded Pelican Professor (L–5) in starch percentage but eight varieties exceeded it considerably in yield of starch per acre, and 14 exceeded it in total yield.
Seedlings have been selected for further trial.

Cotton
The early development of the embryo in several species shows inherent differences which may be valuable in clarifying interspecific relationships.
Lines are under test for *Verticillium* wilt resistance.
A summary is given of the results of trials of 12 varieties at seven locations in the Yazoo-Mississippi Delta, which were carried out by the Delta Branch Station (cf. Abst. 1054). Breeding work at this sub-station includes improvement of Delfos, Missdel, Deltatype Webber and other cottons. Suitability for the complete mechanization of future cotton production is under investigation.

Sweet sorghum
Named varieties and new strains are under trial; wide differences in syrup quality have been observed.

Fruits
Observations on apple varieties and selections show that Early Harvest, Red Astrachan, Eckles, Carlton, Motto, Red Rowden and selections No. 362, 363 and 364 are the most promising for the domestic orchard; most of these varieties and selections possess some degree of fire blight resistance.
The Pontotoc and Waite pears have exhibited fire blight resistance.

Cucumber
Breeding work on pickling cucumbers continued.

Tomato
Disease resistant varieties are being developed.

Bean
Breeding and selection for pod quality and resistance to bacterial blight and rust are reported.

Cowpea
Selection is in progress.

Soya bean
Varietal tests of soya bean suitable for oil production were carried out under the regional testing programme in the Southern States. Vegetable soya bean varieties were also tested.
Crosses of Ogden with other varieties are under investigation at the Delta Branch Station. Strains combining the high-yielding capacity of Ogden with the non-shattering habit of Arksoy are being developed.

640. 575:633(77.1)

Farm science and practice.
64th Rep. Ohio Agric. Exp. Sta. 1946 : Bull. 665 : Pp. 50.

Timothy
Early strains usually produce higher hay yields and a better aftermath crop than late strains when grown in Ohio and other parts in the south of the region where timothy is produced in the United States. The value of the recently introduced Marietta timothy is emphasized (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 242).

Tomato
F_1 hybrids of greenhouse varieties were compared with Globe strain A, Marhio and Globelle; 13 of the hybrids outyielded the varieties, but six of these were discarded on account of the physiological disease known as blotchy ripening. The hybrids showed considerable variation in chemical content; none were found to have a higher mineral content than the three varieties.
Breeding for uniform colour is also being carried out. Several selections of a uniformly coloured Marhio strain (strain 9–1) have been obtained.

641. 575:633(77.2)

59th Report of the Director of the Purdue University Agricultural Experiment Station for the period ending 30 June, 1946 : Pp. 86.

Wheat
Race 76 of leaf rust has recently attacked the leaf rust resistant variety Wabash. Breeding is in progress to develop soft red winter wheats combining the resistance of Wabash with the resistance of Hungarian to race 76.
Fairfield (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 444) is being used as a parent in breeding; it is hoped to develop a wheat possessing the desirable characters of Fairfield and improved test weight and disease resistance.

Maize
Further evidence has been obtained that the gene pair *Hm hm* determining reaction to *Helminthosporium carbonum* is located on chromosome 1.
Inbred and open-pollinated material is being tested for resistance to *Helminthosporium* leaf blight. Resistant lines are to be used in the development of synthetic varieties.
Hybrid production is reported.

It has been found that the lysine content of the maize grain is not appreciably affected by genetic constitution.

Potato
Scab resistance is receiving attention; a number of seedlings appear to be more promising than the Menominee variety which was recently released by the Michigan Experiment Station (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1047).

Rhubarb
Breeding work is being carried out in an attempt to improve the colour, vigour, uniformity and culinary qualities of forced rhubarb.

Tomato
Progress in breeding for resistance to *Septoria Lycopersici* is reported.
Fusarium wilt resistant strains have been developed from a cross of *Lycopersicon pimpinellifolium* with Indiana Baltimore and Rutgers, and are to be extensively tested.
Selections were tested for their reaction to two physiological strains of *Fusarium* wilt.

Soya bean
Promising strains maturing at the same time as the Patoka and Gibson varieties have been developed; these strains are higher in yield and oil content than Gibson, Patoka and Chief, and shown promise as new varieties for southern Indiana. A strain as early maturing as Richland but superior to it in yield and oil content appears to be well-adapted in central Indiana. The strain is being multiplied for release.

Pea
Crosses have been made with a view to combining as far as possible the following characters in new varieties of wrinkled and smooth seeded canning peas: early maturity, tolerance to heat, vigour and productivity, and uniform ripening. Crossing and back-crossing have also been begun to develop, if possible, a graded series of the Alaska type with different spans of maturity, in order to extend the harvest season. Marked differences between smooth and wrinkled seeded varieties have been observed with regard to specific gravity, percentage of alcohol-soluble substances in the dry seeds, and the percentage of water lost by the ripe seeds in the natural process of drying.

Sweet corn
Purdue 51 B, a new yellow sweet corn inbred, is to be distributed. It is recommended as the pollinator of Purdue 39 A (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1137) for the production of the hybrid to be known as Improved Golden Cross Bantam. The seed of Purdue 51 B is not so liable to suffer from the adverse effect of cold wet soil as Purdue 51. Improved Golden Cross Bantam is more productive and drought resistant than the original hybrid. Seed for the production of four new Country Gentlemen hybrids, designated C5, R5, C14 and R14, is to be distributed.

Popcorn
Breeding work is in progress.

642. 575:633(77.5)

What's new in farm science.
62nd Rep. Wis. Agric. Exp. Sta. Pt. 2 : 1945 : Bull. 469 : Pp. 73.

Oats
The new Forvic variety has been released. It is a white oat, which has outyielded Vicland, the yellow oat variety widely used in Wisconsin. In its disease resistance Forvic resembles Vicland. The new variety was developed from a cross between the Forward white oats and a selection from the Victoria-Richland cross which also gave rise to Vicland.

Maize
The new hybrids, W 464, W 461 A and W 275 A, have been released.

Forage grasses
Brome grass strains differ in vigour when grown in various districts of Wisconsin, indicating the possibility of obtaining better adapted strains.
Investigations on bluegrass have shown that the use of strains inherently superior to the

available commercial strains is only advantageous under better management than is usually given to bluegrass pasture.

Potato

The new Menominee and Kasota varieties (*cf. Plant Breeding Abstracts*, Vol. XV, Abst. 1047 and Vol. XIII, Abst. 1274), respectively, have shown resistance to internal brown spot. Among the standard varieties Triumph, Pontiac and Red Warba proved the least susceptible.

Tobacco

The new strain Havana 307 has been released. It is resistant to black root rot. Unlike Havana 142, the strain does not sucker excessively. Work is being carried out on another new strain, Havana 322), which resembles Cornstock Spanish, but unlike this variety Havana 322 is resistant to black root rot.

Tomato

The new canning variety, Wisconsin No. 55, shows promise; if it continues to give a good performance it will be named and released. It is early maturing, and outyields the early John Baer and Stokesdale varieties; it shows much less fruit cracking than these two varieties. It is tolerant to early blight and *Septoria* leaf spot, and thus retains its foliage longer than most other varieties. It is susceptible to wilt.

643. 575:633(78.2)

60th Annual Report of the University of Nebraska College of Agriculture, Agricultural Experiment Station 1947 ; Pp. 103.

Wheat

In tests of winter wheat varieties at one location, the new selection Cheyenne x Turkey 1062 (C.I. 12142) ranked fourth in yield. The selection is bunt resistant. In the last two years it has outyielded Cheyenne by 9%.

Oats

The experimental strain Victoria-Richland x Morota-Bond (C.I. 4301) has given high yields. It is resistant to *Helminthosporium* disease.

Maize

Breeding work on waxy hybrids has now reached the stage of testing inbred lines in top-crosses and single crosses.

A new yellow hybrid with mid-season maturity has been designated Nebraska 502 and approved for release in 1947. Its pedigree is (Wf9 x 187–2) x (N6 x A). The hybrid is particularly suitable to cultivation under irrigation in central Nebraska.

Promising new white hybrids have been developed, which are equal and superior in yield to K2234, a late white hybrid adapted to south-eastern Nebraska. These hybrids ripen a few days earlier than K2234.

Barley

Breeding is in progress.

Sorghum

In tests of experimental grain varieties at Lincoln, an early maturing selection of Club developed at the Fort Hays Branch Experiment Station, Kansas, and a selection from the cross Weskan x Greeley showed promise.

Among the forage sorghums tested, an early maturing selection of Atlas named Axtell (cf. Abst. 945) has given a lower yield of forage per acre than Atlas but a higher grain yield. The selection, which was developed by a farmer at Axtell, Kansas, and named by the Kansas Agricultural Department Station, is now eligible for certification in Nebraska as well as Kansas.

Breeding work to develop improved grain and forage varieties continues. Several selections of the grain type derived from the crosses Western Blackhull x Day and Sooner x Club show promise. Valuable selections of the dual purpose sorghum have been obtained from the cross Atlas x Highland.

Forage grasses

Breeding and selection work on crested wheatgrass, side-oats grama, blue grama and several other grasses is in progress.

Investigations on pollen dispersal in relation to seed production and the maintenance of pure seed stocks have been carried out on 40 cross-pollinated grass species.

Forage legumes

The results of investigations on factors affecting lucerne seed production are summarized. Differences in seed production shown by individual plants and clonal lines is attributable to at least two factors: firstly, an inherent tendency for the production of more flowers per plant and more seed per pod, and secondly, an inherent variability in attractiveness to bees. The latter variability may be associated with the tripping mechanism and with differences in the quantity and quality of the pollen and nectar. These variations affecting seed production are receiving attention in breeding work.

The value of the polycross test in predicting combining ability of clonal lines has been confirmed by the results of work on synthetic varieties.

Sweet clover breeding is reported.

Hybridization between *Melilotus alba* and *M. polonica* has resulted in plants apparently possessing both vigor and large seeds.

Selections of birdsfoot trefoil gave yields of seed ranging from 13 to 154 pounds per acre, indicating the possibility of producing an adapted forage strain yielding sufficient seed to warrant production under conditions in eastern Nebraska.

Astragalus cicer produced 105 pounds of seed per acre. The species is to be tested in grass mixtures under pasture conditions.

Chufa

Plantings of chufa (*Cyperus esculentus* L.) are under observation. The plant may be useful as a food for pigs. The difficulty of harvesting the tubers found in the crown of the plant, however, limits the usefulness of chufa as an agricultural crop.

Potato

The selections SND48–2 and 24.38–3 have been designated Nebraska 2 and Nebraska 3, respectively. Nebraska 2 has given high yields of white tubers which are unusually uniform in shape, and which possess high specific gravity and high ascorbic acid content. The selection appears to be adapted to all districts of Nebraska. Nebraska 3 produces deep red, medium-sized uniform tubers; it may have some resistance to scab and *Fusarium*. It appears to be adapted to western Nebraska only. Both selections show promise of being superior to present-day varieties in the state; they are being increased at the Box Butte Experiment Farm.

Castor bean

Breeding for non-shattering is being carried out.

Sesame

Early maturing selections have been secured which mature within the growing season of eastern Nebraska. Pure lines with additional seed colours have also been produced; tan coloured, reddish brown and dark grey seeds have been obtained.

Safflower

Trials are being conducted in co-operation with other states, which will provide information on the adaptation of safflower, and the performance of new selections and promising introductions.

Small multiplication plots of two new lines, Nebraska 478 and Nebraska 852, were grown. The seed of Nebraska 478 contains 30–32% oil and 40% hull. This line gives good yields and possesses a high degree tolerance to grasshoppers. The seed of Nebraska 852 contains 33–35% oil and 40% hull. It does not form a rosette, a character of considerable importance in weed competition; but it is more susceptible to grasshoppers than Nebraska 478. The safflower mixture now grown in western Nebraska gives seed containing 28–29% oil and 46–48% hull.

Phaseolus

In breeding for halo blight resistance promising hybrid selections are under investigation. Data from the F_1 of the cross between the halo blight resistant Mexican Red variety and susceptible Asgrow Stringless show that the resistance carried by Mexican Red is dominant. An F_7 line of white field bean proved superior in yield to U.I.59.

644. 575:633(78.7)

Fifty-fifth Annual Report of the University of Wyoming Agricultural Experiment Station 1944-1945 : Pp. 46.

Wheat
Spring and winter varieties were tested.

Oats
Selections C.I. 3916 and C.I. 4180, derived from a cross between Bannock and Victoria-Richland, have outyielded Bannock.

Barley
Bulk Selection 36 Ab 109 (W47) produced the highest yields on irrigated land, and is being increased.

Lucerne
Wilt resistant and winter hardy lines are being developed.

Potato
Breeding for resistance to ring rot, psyllid yellows and scab is reported.

645. 575:633(79.1)

57th Annual Report of the Arizona Experiment Station for the year ending June 30, 1946 : Pp. 74.

Wheat
Crosses and back-crosses of Baart 38 on derivatives of *Triticum Timopheevi* are being selected.

Barley
Selections of the cross Vaughn x Scarab have given promising grain and forage yields.

Lucerne
Selection is being carried out on the Indian and African varieties, both southern types without winter dormancy.
Bacterial wilt resistance is receiving attention.

Cotton
In long staple cotton breeding, the progenies of multiple crosses involving Pima, S x P, Tangüis Sea Island and Upland are under selection, with a view to developing a type with a reduced size of plant, and a larger boll possessing the lint length and quality of the Egyptian cotton.
Upland cotton breeding work is directed towards the development of cottons superior to Santan. Progenies of the following crosses and back-crosses are under investigation: Santan x 1517, Santan x Stoneville, Santan x Wilds No. 13, Santan x (Santan x 1517), Santan x (Santan x Wilds No. 13) and Wilds No. 13 x (Santan x Wilds No. 13).

Lettuce
Breeding for resistance to bolting under conditions of high temperature continues.
In the vitamin analysis of 23 varieties no correlation between variety and vitamin content was observed.

Cantaloupe
Various hybrid and inbred strains were tested. A strain of Imperial 45 produced in Arizona showed promise. Hybrids between the U.S.D.A. mildew resistant melon and Arizona 13 were selected.

646. 575:633(79.8)

Tenth Progress Report of the University of Alaska Agricultural Experiment Stations, College, Alaska, 1944-1945 : Pp. 85.

Cereals
A report is given of trials of wheat, oats and barley varieties carried out at the Fairbanks Station. The trials included the best adapted varieties in Alaska, and introductions from Siberia, Canada and Minnesota. Tests of varieties and selections were also conducted at the Matanuska Station. Wheat hybrids were selected, many of which have Chogot as

one parent. Selection was made in strains of the Alaska Black and 19–B barleys. In the oats trials two strains of Climax, one large kernelled and the other small kernelled, gave the highest yields.

Forage plants

Breeding work on *Medicago sativa* aims at the production of winter-hardy varieties which give high yields of good forage, set sufficient seed, and possess other desirable characteristics. The following investigations are in progress: a survey of the available breeding material; hybridization with the winter-hardy species yellow lucerne (*M. falcata*); a study of the plant characters associated with the winter hardiness of yellow lucerne; and the study of the various environmental factors causing winter-killing. Tests during 1944–5 provided further evidence that none of the varieties and strains of lucerne at present available possess sufficient winter hardiness to survive more than one or two winters.

Breeding work is being carried out on *M. falcata* to obtain hay and pasture types with improved seed-setting capacity.

Objectives in red clover breeding include improved forage quality, a more erect growth habit, increased winter hardiness and seed production. The original breeding material consisted of a red clover strain introduced from the Soviet Union.

Tests of various legume and grass species are reported.

Potato

Breeding is in progress.

Vegetables

Varietal trials of cabbage, lettuce and celery were carried out at the Matanuska Station.

647. 575:633(82)
575:633(89)
CÁRDENAS, M.
Informe sobre el viaje de estudio realizado a la Argentina y el Uruguay por alumnos de la escuela Superior de Agronomia de Cochabamba, en 1944.
(**Report on an academic tour in Argentina and Uruguay made by students of the Cochabamba Institute of Agronomy in 1944**).
Rev. Agric. Cochabamba 1945 : **2** : 3–13.

Information is given on the plant breeding and other activities of the following research centres: the Santa Catalina Plant Breeding Institute, the Faculty of Agronomy of La Plata, the La Estanzuela Plant Breeding Institute, the Potato Experimental Station of Balcarce, the Faculty of Agronomy of Buenos Aires, the Bernardino Rivadavia Natural Sciences Museum, and the Buenos Aires Botanic Garden.

648. 575:633(82)
CROSS, W. E.
La Estación Experimental Agrícola de Tucumán. (**The Tucumán Agricultural Experimental Station**).
Circ. Estac. Exp. Agric. Tucumán 1946 : No. 135 : Pp. 4.

A brief outline is given of the history and achievements, including plant breeding, of the Tucumán experimental station.

649. 575:633(93.1)
Twenty-first annual report of the Department of Scientific and Industrial Research, New Zealand 1947 : Pp. 84.

Wheat

Two new varieties are to be distributed as a result of work at the Wheat Research Institute, Christchurch. One of these varieties, designated 78,01, has been developed from the cross Tuscan x Tainui; it has not yet been named. In baking quality this wheat is approximately equal to Cross 7; it matures slightly earlier than Cross 7 and is somewhat taller. In trials during the last six years the new variety has outyielded Cross 7 by an average of 3·8 bushels per acre. The other variety has been named Hilgendorf (140,014); it has been produced from Cross 7 x Tainui. In baking quality it is superior to Cross 7 and Marquis. On medium to good land the new variety has yielded the same as, or slightly less than, Cross 7. Promising new lines are under trial; two lines yielded approximately 20% more than Cross 7 in tests at two locations.

Oats
The following recent introductions were compared with Abundance and Onward: Binder, Royal Scot, Spitfire, 10/3 (Resistance x Grey Winter) and the Aberystwyth varieties, S.84, S.147 and S.172. Additional hybrids are under observation.

Rye
Material from Great Britain and Australia is being selected.

Maize
Double hybrids introduced from the United States were tested; the later varieties were superior to the earlier ones in yield, but growth was much slower than in the United States.

Barley
Breeding work continues with the aim of developing a high yielding malting type of good quality, which might be suitable for breeding.
To provide nucleus stocks for a proposed barley certification scheme, the following varieties were increased: Spratt Archer, Plumage Archer, Chevallier, Research and Kenia. Of the feed types, Wong, Prefect, Campton and Smooth Awned Cape were propagated to provide seed for further trials; and Newal was increased for distribution.

Forage grasses
Further breeding is being carried out on perennial, Italian and short rotation ryegrass. A biennial strain of Italian ryegrass has been bred. Work is in progress to develop a productive Western Wolths ryegrass and also a long rotation ryegrass; the latter is being produced by hybridization between perennial and Italian ryegrass.
An attempt is being made to develop a strain of perennial ryegrass which is resistant to blind-seed disease (*Phialea temulenta* Prill. et Delacr.) but otherwise similar to the present pedigree strain in use.

Forage legumes
Introduced strains of lucerne were tested in comparison with Marlborough and Strain B, a pedigree strain developed by the Agronomy Division, Lincoln, South Island; Strain B proved superior and is to be distributed as a certified strain.
Selections of *Lupinus angustifolius* and *L. luteus* introduced from Germany are under trial.

Rape
A nucleus stock of a club-root resistant strain developed by the Plant Diseases Division, Auckland, gave a high seed yield; further trials are to be carried out.

Swede
The Dryland swede (Grandmaster x Sensation) is to be further tested. Further crosses were made between Dryland and Superlative.

Potato
Breeding continues; a line from a cross between Katahdin and *Solanum andigenum* appears to possess some degree of mosaic resistance.

Flax
Nucleus seed of the Liral Crown and Stormont Gossamer linen flaxes was grown.
Re-selected lines of Stormont Cirrus are under test for fibre content and quality.
Pure lines of three Russian varieties which have shown rust immunity are being multiplied.
Varieties introduced from America and one variety from Western Australia are under observation for their reaction to rust.

Phormium
Breeding and selection continue.

Tobacco
In a varietal trial at the Tobacco Research Station, Harrison's Special 215 continued to produce high yields. The American varieties, Special 400 and Special 401, also gave high yields.
Varieties and lines were tested for their black root rot resistance in seedling beds. A number of varieties were resistant, but certain susceptible varieties showed a higher degree of resistance in the field, with higher temperatures of the soil and air. In seedling bed tests

of varietal reaction to *Verticillium* wilt, Wills' Harrison's Special, Ambalema and Kelly showed resistance.
In breeding for a mosaic resistant type, promising flue cured lines have been secured. Breeding for black root rot resistance is also in progress; until new varieties are developed, Harrison's Special 215 and Special 400 provide a fair degree of resistance.

Linseed
Golden Viking, Rio and certain Tasmanian varieties which are rust resistant are being re-selected.

Fruit Crops
Varietal and rootstock trials of apples were carried out at the Research Orchard, Appleby, South Island, and by the Plant Diseases Division, Auckland. Strains within the varieties Delicious and Cox's Orange have been isolated, and a comparison made of their keeping qualities. Strains of Delicious have been obtained which are resistant to mouldy core.
Peach varietal trials and observations on the flowering and fruiting characters of persimmon varieties have been carried out by the Plant Diseases Division, Auckland.

Pea
Breeding work on garden peas aims at the production of an early variety with high quality, a Greenfeast type resistant to pea mosaic, and an improved variety suitable for canning at the green pea stage.
Work is being carried out on field peas to develop an improved variety of the Partridge type; selections of cross between Partridge and Black Eyed Susan are under investigation. Selection work to obtain a blue pea with a higher yield than Blue Prussian but with smaller seed than Mammoth Blue has been begun.

650. 575:633(96.9)

64th Annual Meeting of the Hawaiian Sugar Planters' Association held at Honolulu, Oahu, T.H. December 4, 1944 (1945) : Pp. 82.

Maize
A new synthetic variety developed by crossing Mayorbelo, a yellow variety introduced from Puerto Rico, with Guam, Kohala Yellow, Cuban Flint and other tropical strains, has been named Hawaiian Yellow. The variety is resistant to mosaic and leaf hopper; it appears to be hardier than Mayorbelo.

Sweet potato
As a result of tests during the year under review, Tantulus appears to be the most satisfactory variety for cultivation under lowland conditions.
Local varieties have been intercrossed, using the "melting pot" technique devised by J. C. Miller of the Louisiana Experiment Station (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 486). This technique is as follows. Vines about to flower are put in pails containing fresh water or a weak nutrient solution. Roots develop within a few days; the vines flower and ripen their seeds normally under this treatment. Crossing is effected by bees.

Sugar cane
Seedlings were obtained by the "melting pot" technique of crossing (cf. section of this summary on sweet potato).
The Indian breeding cane, Chunnee, and its derivatives are to be used in breeding for resistance to Fiji disease.
Rating for toughness of the cane stalk has been included in the characteristics upon which seedling selection is based; cane yields and juice quality may be affected by the amount of fracturing occurring at the base of the stalk during lodging; this fracturing depends upon the toughness of the stalk. Toughness is judged by pushing the standing stalks one by one in the direction in which they are leaning, until they approach a horizontal position. An extremely brittle cane will snap under this treatment; a tough cane will bend without fracturing.
Notes are given on the following new seedlings which have consistently equalled the performance of the cane 32–8560, or have shown superiority over this cane under special conditions: 329624 (UD 110 x POJ 2878); 33–9405 (28–4615 x POJ 2878); 35–1515 (31–1389

x ?); 35–2154 (32–210 x ?); 37–1933 (32–8560 x 34–1874); 37–4888 (33–7673 x ?); 38–2915 (32–8560 x POJ 2878); and 38–4744 (32–8560 x 32–1063).

Cauliflower
It has been found that Indian varieties are well adapted to Hawaiian conditions.

Tomato
Use is being made of *Lycopersicon pimpinellifolium*, *L. peruvianum* and *L. chilense* in breeding for resistance to diseases, melon fly and nematode.

Soya bean
Tests at the Kailna and Waipio substations have shown that the varieties Venezuelan, Maconpin, Potchefstrom, Tojkio and White Biloxi are suitable varieties under lowland conditions for the production of dry beans. The varieties Sac, Giant Green, Hahto 2–B, Seminole and Giant Speckled are recommended as green edible varieties, and Java 29, Avoyelles and Java 16 as varieties for forage and hay.

Sweet corn
By crossing U.S.D.A. 34 and other tropical strains with Golden Cross Bantam and similar sweet corns, a synthetic variety has been produced which combines resistance to leaf hopper and mosaic with good quality. This new variety has been provisionally named Hawaiian Sugar.

651. 575:633(96.9)
65th Annual Meeting of the Hawaiian Sugar Planters' Association held at Honolulu, Oahu, T.H. December 10, 1945 (1946) : Pp. 76.

Sugar cane
Further crossing was carried out by the labour saving "melting pot" technique (cf. Abst. 650).
The new seedlings 37–1933 (32–8560 x 34–1874) and 38–2915 (32–8560 x POJ 2878) again outyielded cane 38–8560 in regional tests. The new seedling 40–5168 (33–6989 x 31–1203) outyielded 38–8560 at the Hilo Variety Station; it shows promise as a possible commercial variety for the Hilo district.

Sweet potato
New seedlings are under selection.

Tomato
Breeding for resistance to diseases and melon fly attack continues.

Sweet corn
The new variety Hawaiian Sugar requires to be further selected to reduce the proportion of mosaic susceptible plants and off-type ears.

652. 575:633(96.9)
66th Annual Meeting of the Hawaiian Sugar Planters' Association held at Honolulu, Oahu, T.H. December 2, 1946 : Pp. 97.

Sugar cane
Several canes which at the Kailua Breeding Station rarely tassel or do not tassel at all produced fair numbers of tassels at Maunawili; it has thus been possible to use these canes in breeding.
An attempt is being made to induce tasseling by treatment with hormone-like substances.
A revised testing procedure for ratoon selection is given.
On good irrigated land seedling 37–1933 is superior to the standard cane 32–8560; but under adverse conditions, particularly drought, its performance is less good. The seedling is to be further tested.
Further crossing was carried out by the "melting pot" technique (cf. Abst. 651); biparental crosses were also made.

653. PUNNET, R. C. 575:633:007
Dr C. C. Hurst.
Nature, Lond. **1948** : **161** : 46–47.
Dr Hurst's genetical work and his study of the genus *Rosa* are referred to.

654. LJUNG, E. W. 575:633:061.6(48.5)
Sveriges Utsädesförening 1936–1945. (**Swedish Seed Association 1936-45**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 191–225.
This report on the Swedish Seed Association deals with the organization, management, officials and staff and scope of the work at the main institute and substations, with photographs of buildings and equipment, and information on the system of multiplication and distribution of varieties to farmers, control over varieties on the market, and on the co-operation maintained with the Swedish Seed Co. and the State Central Seed Control Institute and other bodies.
A section on the economic position and on financial aid is also included.

655. 575:633:35(49.2)
Plant Breeder's Decree 1941.
The Board for the Plant Breeder's Right, The Hague, Netherlands 1946 : Pp. 18.
The legal status of the plant breeder in the Netherlands is defined.

656. TAVČAR, A. 575:633:578.08:581.192
Differenzmethode zur schnellen Bestimmung des Rohfettes im pflanzenzüchterischen Material. (**Difference method for the rapid estimation of crude fats in plant breeding material**).
Züchter 1941 : **13** : 145–47.
Hundreds of estimations are needed in finding the crude fats in oil-bearing seeds and other material in plant breeding. The standard Soxhlet method only allows of one or two estimations per sample per day. The differences in the values for crude fat content in the seeds of soya bean, rape, turnip, sunflower, winter wheat and dwarf bean as found by the "difference method A" agree well with those from the ordinary Soxhlet method. The "difference method A" needs less time and material and is cheaper than the Soxlet method. A second variation "difference method B" has the advantages of the method A and is sufficiently accurate for plant breeding requirements. E. W

657. LINDBERG, J. E. 575:633:581.192:581.6(48.5)
Kemiska avdelningen med cereal- och baknings laboratoriet. (**Chemical Division with the Cereal and Baking Laboratory**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 322–26.
This paper gives a detailed estimation of the work that has been and will continue to be done by the above research branch in assisting Swedish plant breeders in the many problems of quality and technique that arise in breeding to improve the various crop plants. Intimate co-operation has to be maintained between the Chemical Division, its Cereal Laboratory, and the various firms and other concerns representing the industrial interests which ultimately utilize and exploit the new varieties bred.

658. RUSSELL, E. J. 575:633.11:007
Sir Albert Howard, C.I.E.
Nature, Lond. 1947 : **160** : 741–42.
Reference is made in this obituary notice to the work of Sir Albert Howard and his wife on the selection and crossing of varieties of wheat in India.

*GENETICS 575.1

659. TAVARES, H. 575.1
As leis de Mendel e a genética. (**Mendel's laws and genetics**).
Bol. Sec. Agric., Pernambuco 1945 : **12** : 21–29.
An elementary account is given of Mendelism and its applications in plant and animal breeding.

* General studies, see also individual crops.

660. TAVARES, H. 575.1
A essência da hereditariedade. **(The essence of heredity).**
Bol. Sec. Agric., Pernambuco 1945 : **12** : 155–59.
An elementary account is given of present-day theories of the gene and chromosome.

661. BOERGER, A. 575.1(47)
Las discusiones contemporáneas sobre la "nueva" genética vegetal soviética. **(Contemporary discussions on the "new" soviet plant genetics).**
Ciencia e Investigación 1947 : **3** : 421–28.
An account is given of the salient features of Lysenko's genetical system, following largely the conclusions reached by Dobzhansky, and Hudson and Richens (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365). The author resolves the apparent conflict between the Mendelian and evolutionary attitude to living organisms, and shows how several of the earlier objections to Mendelism have been met by more recent research.

662. OPPENHEIMER, C. 575.1(47)
(The new theory of heredity in Soviet Russia).
Hassadeh 1947 : **27** : 516–19.
A fairly extensive abstract in Hebrew is presented of the publication of Hudson and Richens issued by the Commonwealth Bureau of Plant Breeding and Genetics in 1946 (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365). The author expresses the hope that it will prove possible to translate the entire publication into Hebrew since many of the leading agriculturists in Palestine know Russian better than English, and are therefore better aquainted with Lysenko's theories than with Mendelian genetics. C. O.

663. SAX, K, 575.1(47)
Soviet science and political philosophy.
Sci. Mon., Lond. 1947 : **65** : 43–47.
An attempt is made to evaluate the influence of dialectical materialism on Russian science, especially genetics.
Much of the account is based on *The New Genetics in the Soviet Union* by Hudson and Richens (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365). The antagonism to Mendelian genetics, the doctrines of Lysenko, his influence in the Soviet Union and alogical methods of argument used in Russian scientific literature are discussed.

664. FISHER, R. A. and
DE BEER, G. R. 575.1:007
Thomas Hunt Morgan 1866-1945.
Obituary Notices of Fellows of the Royal Society, 1947 : **5** : 451–66.
In this obituary notice of T. H. Morgan, reprinted from Obituary Notices of Fellows of the Royal Society, London, (Vol. **5**: March 1947), R. A. Fisher presents an appreciation of his genetical work, and G. R. de Beer writes of Morgan as an experimental embryologist. A bibliography of Morgan's published work is appended.

665. DOBZHANSKY, TH. 575.1:007(47)
N. I. Vavilov, a martyr of genetics. 1887-1942.
J. Hered. 1947 : **38** : 227–32.
A biography is presented of Vavilov, the well-known Russian geneticist. After describing Vavilov's earlier successes, the author deals with the controversy between Vavilov and Lysenko, following largely the account by Hudson and Richens (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365), and then supplies information on his movements between the 1939 Conference on Genetics and Selection at Moscow and his death in 1942.

666. GATES, R. R. 575.1:007(47)
(Vavilov and the Soviets).
Sci. and Cult. 1947 : **12** : 423–27.
An account is given of the life and work of Vavilov. The doctrines of his successor, Lysenko, are referred to, and it is contended that "the ideas of the latter at their best are complementary to but not contradictory to the results of genetics".

667. SURKOV, A., TVARDOVSKIĬ, A. and FIŠ, G. 575.1:007(47)
(Society under judgment).
Literaturnaja Gazeta 1947 : No. 36 : p. 1.
Exception is taken to Žebrak's criticisms of Lysenko published in *Science* (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 596). Žebrak is regarded as unpatriotic, since he has declared himself in favour of co-operating with western bourgeois geneticists such as Sax and Darlington for the development of world science. Žebrak's claim that Lysenko was rewarded by the Soviet authorities for his agronomic work alone is denied.

668. BURR, H. S. 575.1:538
Field theory in biology.
Sci. Mon., Lond. 1947 : **64** : 217–25.
The relation between electrical potential and genetic constitution is discussed. The seeds of four inbred strains of maize and three hybrids showed significant differences in potentials. One strain had a potential of more than four times that of a single gene mutant derived from it. The potential differences in the hybrids showed a gradation closely correlated with the measurements of heterosis. Likewise in the pure strains, a positive correlation existed between the yield and the measured standing potentials of the seed. The subsequent history of a seed could, therefore, be predicted on the basis of its potential. Such prediction has been made and has proved correct. It was found, too, that plants grown from high potential seed produced seed with high potential. In addition to these results, clear cut evidence was obtained that the magnitude of the standing potential was related not only to growth capacity or heterosis but also to genetic constitution.

669. MANUNTA, C. 575.11
I nuovi orizzonti della fenogenetica. (**The new horizons of phenogenetics**).
Atti III Riunione Soc. Ital. Genet. Eugen., Bologna 1938 : **16** : Pp. 24.
The study of the extrinsication of genic potentialities is considered under three heads, cytoplasmic inheritance, the development of mutants and the biochemical determinism of characters. As regards the first, an examination of the evidence leads to the conclusion that no single example is yet known of a hereditary character determined by the constitution of the cytoplasm, though the expression of a genic character may be influenced by the properties of the cytoplasm.
The velocity of certain reactions is next discussed as a property which distinguishes many mutants and hence must be regarded as a basic factor in gene action, the name of Goldschmidt being particularly associated with this concept; the argument is enforced by experiments with phenocopies; studies with genes in varying doses, tissue transplants and gene interaction have given much evidence concerning the quantitative nature of gene action. Pigmentation of silk worm cocoons has been shown by Jucci to be dependent not on the quantity of pigment present, which is influenced environmentally, but on the permeability for specific pigments of the intestines and other organs; permeability is always dominant to impermeability but the heterozygotes can be detected by analysis and often by eye. Chromatographic analysis has shown that every race is characteristic in its precise capacity to pass the different pigments from the blood to the silk. The migration rate of the several pigments is also related to their chemical constitution.

670. KRAMER, H. H. and BURNHAM, C. R. 575.116.1:519.24
Methods of combining linkage intensity values from backcross, F_2 and F_3 genetic data.
Genetics 1947 : **32** : 379–90.
The following maximum likelihood formulae have been derived for determining repulsion values of p from different sources of data involving two pairs of genes:—

Back-cross

$$\frac{(a+d)}{p} - \frac{(b+c)}{(1-p)} = 0$$

F_2

$$+ 2p\left[\frac{a}{(2+p^2)} - \frac{(b+c)}{(1-p^2)} + \frac{d}{p^2}\right] = 0$$

F_3 from F_2 of type Ab

$$+ \frac{k}{p} - \frac{j}{(1-p)} - \frac{(j+k)}{(1+p)} = 0$$

F_3 from F_2 of type aB

$$+ \frac{m}{p} \quad \frac{1}{(1+p)} \quad \frac{(m+1)}{(1+p)} = 0$$

F_3 from F_2 of type AB

$$+ \frac{(2e+f+g)}{p} - \frac{(f+g)}{(1-p)} - \frac{2(h+i)(1-2p)}{(1-2p+2p^2)} - \frac{2p(e+f+g+h+i)}{(2+p^2)} = 0$$

F_3 separation of doubly heterozygous F_2 plants into AB/ab and Ab/aB types.

$$+ \frac{2h}{p} - \frac{2i}{(1-p)} + \frac{2(h+i)(1+2p)}{(1-2p+2p^2)} = 0$$

Modification of these formulae for coupling data are also given.
Following Fisher, the authors develop formulae for the standard error of p and illustrate Fisher's method of scoring linkage data (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 567).

671. GOODSMITH, W. and HINTON, T. 575.116.1:576.356.2
Altering the expression of position effect.
Biol. Bull. Wood's Hole 1947 : **93** : p. 194.
The results of experiments on the character of plum eye colour in *Drosophila melanogaster* have suggested that in several cases a chromosomal inversion has a modifying effect upon the expression of another chromosomal inversion.

672. HINTON, T. 575.116.1:576.356.2
Factors influencing the expression of "position effects".
Biol. Bull. Wood's Hole 1947 : **93** : p. 216.
Investigations on inversion (2 LR) 40d in the second chromosome of *Drosophila melanogaster* have shown that temperature, starvation, the presence of an extra Y chromosome and modifying factors can alter the position effect.

673. HAUSSMANN, G. 575.12:575.148(47)
Il "rinnovamento di sangue" nelle razze selezionate delle piante agrarie.
("Rejuvenation of blood" in selected races of agricultural plants).
Annu. R. Ist. Sper. Chim. Agrar. Torino 1941–1945 : **15** : 167–78.
An account is given in Italian of some of the results of intravarietal crossing published in the U.S.S.R. (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 1100) and of the principles of the "love-match", selective fertilization, pollen mixtures and the training of hybrids (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365).

674. BAKER, H. G. 575.12:576.312.3
Biological flora of the British Isles.
J. Ecol. 1947 : **35** : 271–92.
References are given to literature on the chromosome numbers, chromosome morphology and polyploidy in *Melandrium album* and *M. dioicum*. A table of criteria of hybridity in *Melandrium* is also included.

675. Rick, C. M. 575.12:578.08
A flower marker for plant-breeding operations.
Science 1947 : **106** : p. 645.
The use of special, weather-proof markers for marking flowers in cross pollination experiments is described.

676. Sosa-Bourdouil, C. 575.127:581.192:576.354.46
Sur le chimisme des étamines de digitales au cours du développement chez quelques types et hybrides. (**On the chemistry of the stamens of foxgloves during the course of development in some species and hybrids**).
Bull. Soc. Bot. Fr. 1946 : **93** : 36–38.
The nitrogen and phosphorus content of the mature anthers of sterile hybrids is found to be significantly lower than in the normal fertile foxglove species. There is evidence, moreover, of a change in the metabolism of the stamens of the hybrids studied during the course of their development.
It is noted also that anomalies in the development of the hybrid pollen grains coincide with a marked deficiency in nitrogen and phosphorus.

677. 575.127:633.42
575.127:633.1
Olesen, O. J. 576.356.5:633.42
Om Betydningen af Arts- og Slaegts-Hybrider i Planteforaedlingen. (**On the importance of interspecific and intergeneric hybrids in plant breeding**).
Ugeskr. Landbr. 1944 : **89** : 180–82.
The recognition that many important economic plants, e.g. *Triticum vulgare*, are polyploids has led to intensive work in plant breeding and theoretical genetics on the experimental production of polyploids. Among the many examples of the natural or experimental production of allopolyploids, *Spartina Townsendii* and certain improved forms of sugar cane merit special attention.
The sugar cane variety P.O.J. 2878, famous for its increased disease resistance and sugar content as compared with previous canes grown in Java, is an instance of the creation of a new, valuable form by interspecific hybridization and chromosome doubling.
By the colchicine method the production of autopolyploids of almost all cultivated plants has been made possible. Its use in Sweden to obtain rye x wheat hybrids (*Triticale*) has yielded a great variety of types from crosses between the best wheats and ryes. The hybrids not only combine the good features of the parents, but also exhibit many new and valuable characteristics. Similar work should be undertaken with Danish varieties. Various new types of intermediate forms and different new combinations that could probably be obtained from wheat-rye material by using the chromosome reduplication and the back-cross methods in various ways are suggested.
The boundaries of the species have been broken down and *Triticale* continues evolutionary development among the cereals.
Similar suggestions are put forward in some detail and exemplified by a table showing many potential *Brassica* combinations between swede and cabbage.

678. 575.127.2
Mather, K. 581.162.5:575.11
Species crosses in *Antirrhinum*. 1. Genetic isolation of the species *majus, glutinosum* and *orontium*.
Heredity 1947 : **1** : 175–86.
It was found that although *A. majus* and *A. glutinosum* show less than 3% intercrossing when grown together and allowed to pollinate naturally, artificial pollination between the two species is as easy as within them, and that when pollen from both species was placed on the stigmas of either, hybrids were produced as commonly as parental types. In back-crosses of *A. majus* x *A. glutinosum* hybrids, the segregation of marker genes gave no indication of genes determining an interspecific incompatibility reaction.

The isolation of the two species is due to the adherence of the pollinating bees to a single species when in a mixed stand.
A. majus and *A. orontium*, however, are isolated by an interspecific incompatibility reaction as is shown by the difficulty of crossing the two species and by the disturbed segregation of a marker gene in the back-cross of the hybrid between them to *A. majus*.

679. VALENTINE, D. H. 575.127.2:581.141
Studies in British primulas. 1. Hybridization between primrose and oxlip (*Primula vulgaris* Huds. and *P. elatior* Schreb.).
New Phytol. 1947 : **46** : 229–53.

The results of crosses between *P. vulgaris* and *P. elatior* differed according to the direction of the cross. This is attributed to a difference in constitution of the endosperm. Hybrids between the two species were compatible and fertile when crossed *inter se* and back-crossed, since only the well balanced combinations of genomes survive in the F_1. Comparable interspecific hybridization studies by other workers are reviewed, and it is suggested that behaviour of the type described is characteristic of crosses between species which are not very closely related and which have the same chromosome number.

680. NYGREN, A. 575.127.2:581.163:576.356
Further studies in spontaneous and synthetic *Calamagrostis purpurea*.
Hereditas, Lund 1948 : **34** : 113–34.

Apomictic plants resembling the apomictic species *C. purpurea* were obtained by crossing *C. epigeios* with *C. canescens*, and similar plants were produced by colchicine treatment of *C. canescens* seeds. The results of other hybridizations between *Calamagrostis* species are described and some cytological and genetical observations are recorded.

681. ROZANOVA, M. A. 575.127.2:634.2
(Natural species obtained experimentally).
Priroda (Nature) 1947 : No. 3 : 63–64.

Examples from several countries are referred to. Among the Russian experimenters are Rozanova, who, in 1934, crossed *Rubus idaeus* (14 chromosomes) with *R. caesius* (28 chromosomes) and obtained *R. pruinosus* (42 chromosomes). At the same time forms resembling it were obtained which had 28 and 35 chromosomes, the probable composition of the series, *Sub-Idaei*, being thus suggested. In 1935, Rybin produced a hybrid plum, resembling *Prunus domestica* (48 chromosome), by crossing *P. spinosa* (32 chromosomes) with *P. divaricata* (16 chromosomes). I.Z.

682. TSCHERMAK-SEYSENEGG, E. v. 575.127.5:581.141:577.17
Künstliche Samenerzeugung durch Wuchsstoffe. **(Artificial production of seeds by growth substances).**
Anz. Akad. Wiss. Wien 1944 : No. 6 : 25–27.

Results of the author's work on pollination of wheat by *Lolium italicum*, and even by *Lilium candidum*, suggest that no pollen is needed to produce seeds capable of germination, but instead only growth substances such as the pollen contains and which may in certain cases replace the pollen. To test this theory, the inflorescences of winter barley were dusted with rye pollen which had been made non-viable, then also with growth substances such as are usually found in grain flours, e.g., Betaxin-Vitamin B_1 and Cebion-Vitamin C. Some of the results were positive. Success was much rarer with wheat and rye, but with peas, beans and *Lathyrus odoratus* positive results were obtained now and then. The alternative explanations offered by the author are, that parthenogenesis with stepping up to the diploid occurs or a special type of apomixis; which alternative is correct can be discovered in the case of Mendelian race hybrids by applying this method of fruit formation by stimulation.
Practical application of the method may be found in the case of pollen-sterile plants or hybrids and also of double flowers, e.g. begonias and petunias, in which the female reproductive organs are intact, and in fruit growing the fruit set might possibly be increased by this method where visiting bees are rare.
Relevant earlier work on tomatoes, petunias, begonias, *Nigella damascena*, *Delphinium* and *Eschscholtzia* is mentioned. E. W.

683. Briquet Junior, R. 575.17
Penetrância, expressividade e especificidade do gene. (**Penetrance, expressivity and specificity of the gene**).
Rev. Agric. S. Paulo 1947 : **22** : 265–72.
The genetic concepts of penetrance, expressivity and specificity are explained for the benefit of Portuguese readers.

VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

684. Hudson, J. P. 575.2
The lost scent of *Mimulus moschatus*.
J. R. Hort. Soc. 1948 : **73** : 24–25.
Another communication on the lost scent of *M. moschata* is given (cf. *Plant Breeding Abstracts*, Vol. XVIII, Absts 64 and 66). The present contributor has received information that the scented form is growing wild in an isolated district of Marlborough Province, New Zealand, and suggests these plants may have been derived from scented musk introduced by an early settler, but in view of Gourlay's explanation (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 64) he considers that the origin of these plants from a chance sport among naturalized plants is the more likely explanation.

685. 575.24
Muller, H. J. 576.312
Twin needs of science.
J. Hered. 1947 : **38** : p. 258.
The production of mutations.
Ibid. 1947 : **38** : 259–70.
The speech given by H. J. Muller at the Nobel banquet, Stockholm, December 1946, upon the occasion of his receiving the Nobel Prize, is published, under the title "Twin Needs of Science".
"The Production of Mutations" is the text of the Nobel Prize lecture delivered by H. J. Muller, in which he discussed the nature of artificially induced and natural genic mutations and induced changes in the structure of the chromosome.

686. Kaufmann, B. P. and 575.24:537.531
Gay, H. 575.24:537.61–15
The influence of X-rays and near infra-red rays on recessive lethals in *Drosophila melanogaster*.
Proc. Nat. Acad. Sci. Wash. 1947 : **33** : 366–71.
It is shown that supplementary treatment of spermatozoa of *D. melanogaster* with near infra-red radiation brings about no significant increase in the frequency of X-ray production of recessive, sex-linked, lethal mutations. The effects on the chromosomes of X-irradiation and infra-red irradiation are considered.

687. 575.243:575:633(48.5)
Gustafsson, Å. 575.243:573.531
Växtförädling och mutationer. (**Plant breeding and mutations**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 336–42.
A comprehensive survey is given of research on induced mutation with special reference to work in Sweden on the effects obtained by X-irradiation. An extension of the research programme adopted in 1940 by the Swedish Seed Association [Sveriges Utsädesförening] on induced mutation has been made possible by support received from Hj. Carlborn and some small grants from various foundations. The investigations now cover not only barley and wheat, but also oats, soya bean, sweet lupin, spring rape, white mustard, flax and other plants.
The following aspects of the induction of mutations are discussed: the mode of action of X-rays, and the mutations and mutation types observable in experiments, with examples of the different behaviour of diploids and polyploids.
Morphological and physiological changes induced in barley are instanced. The *erectoides* mutants are particularly numerous; Maja has yielded five, Gull 15, and Ymer (40/12 b_7) ten. In polyploids, such as wheat and oats, morphological mutations are rarer.

All the *erectoides* mutants of barley are characterized by increased strength of straw. Moreover, *erectoides* 1, from Gull, and *erectoides* 12, from Maja, have shown no decline in yield as compared with their parent lines. *Erectoides* 16, also from Maja, not only has stiff straw but is also a week earlier than the mother line, though only 5% lower in yield. One peculiar Gull mutant with a waxy bloom equals the parent form in yield, and in 1945, both at Svalöf and the Branch Stations, surpassed most of the commercial strains in yield of straw. Unfortunately its hectolitre and 1000 corn weights are low, but they could probably be improved by hybridization.

Experiments by H. Thunaeus at the Stockholm Breweries indicated that various mutations appear to have better malting quality than the parent forms. One mutation in particular has about 10% higher corn weight and almost 10% higher yield. Another mutant with improved malting qualities is almost identical with the mother line of Gull, though the leaves are broader. Maja has also yielded mutants with better malting properties and higher yields.

Fröier's work on black oats has resulted in variants ripening in some instances a week earlier, and, though their yields are lower, they are of interest for hybridization. Evidence from a number of mutants from Gull, Maja and Ymer barleys suggests that direct induction of variants superior in yield to their parent lines is possible. One straw length mutant from Gull has averaged 3% more grain than the mother line and is also superior to Gull in drought resistance, yielding as much as 10% more than the parent line in dry warm years, though considerably less in damp years. It would therefore seem to have acquired a different water economy.

Levan produced a peculiar yellowish green variant of Concurrent flax, yielding 6% more straw than the parent line in 1944 and 1945 and, according to Granhall, superior to Concurrent in quality.

In extensive experiments on X-irradiation of spring rape a very uniform variant has been isolated with a considerably higher yield than the original Regina spring rape strain, and it may be put on the market as a new variety next year. Since however rape is partly cross-pollinated, it is not absolutely certain that this variant is due to irradiation.

Intensive research is needed on how intragenic changes and chromosome interchanges can best be utilized to obtain the best balance of effect. Some results already seem to point in a certain direction: suitable pre-treatment of seed before irradiation appears to lead to certain types of mutation. For example, the *alboxantha* mutation occurs after the seed has been steeped in water; it never occurs in progeny from seed with a low water content at the time of irradiation. These mutations, even the lethal types, are found mainly in the offspring of plants that are slightly, though clearly, sterile and therefore contain chromosome irregularities of a certain kind. The "drastic" mutations affecting the whole appearance of a plant species arise mainly when intragenic transpositions occur together with extensive chromosome interchanges. Different kinds of irradiation also produce different kinds of effects, e.g. translocations rarely result from ultra-violet but frequently do so after neutron bombardment.

Sweden's outstanding position in practical and theoretical study of these problems demands adequate financial support for further research.

688. DARLINGTON, C. D. and KOLLER, P. C. 575.243:581.04:537.531

The chemical breakage of chromosomes.

Heredity 1947 : **1** : 187–221.

After enumerating the various agents known to induce chromosome injury, classifying the various cytological effects of X-ray action and reviewing the literature on the action of mustard gas on living cells, the authors present an account of an investigation of the direct effects of mustard gas on the chromosomes. The plants used in the investigation were *Allium Cepa* for mitotic studies and *Tradescantia bracteata* for studies of meiosis.

Three kinds of qualitative effects on chromosomes were observed, (1) weakening,breaking and mis-division of the centromere, (2) an excessive nucleic acid charge accompanied by stickiness of the chromosomes causing various anomalies, and (3) breaking of the gene string during interphase. The significance of these phenomena is discussed. They

provide confirmation of the contentions that (1) breaks do not heal in the resting nucleus, (2) the intensity effect is due to competition for reunion and proves only that breakage is immediate, (3) apparent chromatid breaks can be due to the delayed reunion of chromosome breaks and (4) isochromatid breaks do not occur.
The breakage effects of mustard gas and X-rays are compared with spontaneous breaks, from which they differ in their higher frequency of sister reunion among acentrics and in their lower frequency of sister reunion in cells with more breaks. The significance of these differences is discussed.
The close similarity between chemical and physical breakage and their results is interpreted, as favouring the view that X-ray breakages as well as chemical breakages are immediately determined by chemical processes and are not due to the direct action of ionizing radiations.

689. 575.243:581.143.26.03
Induced adaptability in plants. (Adapted from the 7th Sir J. C. Bose Memorial lecture delivered by P. Parija).
Sci. and Cult. 1946 : **11** : 470–72.

Vernalization is discussed as an example of induced adaptability, concerning the heritability of which there is as yet no indisputable evidence. A consideration of the artificial production of cyto-genetical changes in plants by X-rays and colchicine treatment considered raises the question as to whether such changes are produced in nature. Work is cited (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 312) which appears to support the conclusion that polyploidy does arise in response to habitat factors.

ADAPTATION 575.3

690. HALDANE, J. B. S. 575.3
Nature and nurture.
Listener 1947 : **38** : 974–75.

The ways in which the environment and genetical constitution interact in the development of organisms are briefly outlined. Reference is made to Lysenko's views on this subject.

SELECTION 575.4

691. KOZO-POLJANSKIĬ, B. M. 575.4:581.162.3
["Anti-ecology" regarding *Parnassia palustris*. (A defence of Darwinism in flower ecology)].
Botaničeskii Žurnal (J. Bot. U.R.S.S.) 1947 : **32** : 15–22.

Evidence was obtained by Martens in 1936, at Louvain University, that the flowers of *P. palustris* may undergo self pollination; he is also reported to have found that the seeds resulting from self pollination were more numerous, larger and more vigorous than those produced by cross pollination. These observations were in contrast to the then generally accepted view that the flowers of this species are protanderous and cross pollinated by insects, and that the staminodes play a role in attracting insects by the flowers. This explanation of pollination in *P. palustris* was accepted by Darwin, according to the present author. In 1933, Danmann questioned the generally accepted role of the staminodes in the pollination of this species by insects. The author has himself obtained evidence of self pollination in *P. palustris*; although he found that the best seed resulted from unrestricted cross pollination. He expresses the view, however, that the occurrence of self pollination in *P. palustris* does not discredit Darwinism and in particular Darwin's theory that cross pollination has advantages over self pollination in natural selection, as Martens is interpreted as suggesting, since variability in nature, of which this apparent contradiction in *P. palustris* is an example, is a fact fully recognized in the works of Darwin and Lenin.

692. CHAPPUIS, P. A. 575.74:581.05
Speologie. (**Speology**).
Experientia, Basel 1947 : **3** : 429–38.

The peculiar characters of the endemic cave animals of Central Europe are thought not to be adaptive but degenerative. The animals are regarded as relict species from the damp soil of the forests of the Tertiary Period.

693. DOMINGUES, O. 576.12
Como Julian Huxley vê a evolução. (**How Julian Huxley regards evolution**).
Rev. Agric. Brazil 1947 : **22** : 1–5.
A brief account is given of the neo-Darwinian theory of evolution and pre-adaptation as expounded by Huxley.

694. SCHINDEWOLF, O. H. 576.12
Darwinismus oder typostrophismus? (**Darwinsim or typostrophism**).
Arb. ung. biol. Forsch-Inst. 1944–1945 : **16** : 104–71.
The thesis is expounded that, while micro-evolutionary processes may be satisfactorily accounted for along neo-Darwinian lines, the latter offer no satisfactory explanation for the macro-evolutionary origin and phyletic history of the higher groups.
Following Heberer, three stages are recognized in the phyletic history of a higher group, viz. (1) typogenesis, a short period of evolutionary explosiveness in which a large number of new forms appear, (2) typostasis, a long period of relative constancy in which evolutionary changes are comparatively small, and (3) typolysis, a final brief period in which a renewal of variability and the production of anomalous forms presage the extinction of the group.
Neo-Darwinism, with its constant emphasis on natural selection, is regarded as incapable of explaining either the origin of new phyla or the orthogenetic trends that palaeontology reveals. As regards the former, it is shown that the deviation of the morphogenetic cycle of a new group from that of the ancestral group occurs very early in ontogeny, when presumably natural selection is least operative. Furthermore, the rapid evolutionary changes of the typogenetic phase are regarded as too quick to allow natural selection to control them. The attempts made to explain orthogenesis by pleiotropy or by selective trends are rejected as groundless, and it is shown that no correlation exists between evolutionary rate and the variability of the environment, as might be expected if natural selection were the paramount factor in evolution.
In reply to the criticism that the macro-mutations or typostrophes that are believed to initiate new groups have never been observed, it is stated that in view of the very limited number of basic morphological types (Hauptbaupläne) that have appeared during the whole of geological history, this is only to be expected. It is pointed out, however, that mutations of generic rank have been reported by Wettstein and Stubbe and by Burgeff (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 393 and Vol. XIV, Abst. 1137).

695. FISHER, R. A. and
FORD, E. B. 576.12:575.41
The spread of a gene in natural conditions in a colony of the moth *Panaxia dominula* L.
Heredity 1947 : **1** : 143–74.
Observations made from 1939 to 1946 on the spread of the *medionigra* gene in a colony of the moth *P. dominula* are recorded and compared with the frequency of the gene prior to 1929. An analysis of the results shows that the fluctuations in gene ratio are too great to be ascribed to random survival alone and must be attributed to fluctuations in natural selection. The view that chance fluctuations in gene ratios, such as may occur in very small isolated populations, can be of evolutionary significance is not supported by this analysis.

696. POLJANSKIĬ, V. I. 576.12:575.7
(**Evolution and "physiological degeneration"**).
Priroda (Nature) 1947 : No. 2 : 20–34.
The author sets out to prove that the works of two members of the Pasteur Institute, Lwoff and Schoen, are attempts to revive Bateson's hypothesis, that evolution is a process of simplification resulting from the successive losses of genes. According to Lwoff who studied micro-organisms, chlorophytes gave rise to leucophytes by losing their chlorophyll, and leucophytes to protozoa by losing their plastids. This process was accompanied by corresponding changes in the nutrition of the organisms, which at first relied on nitrogen in inorganic compounds, then on amino-acids, and finally, as with the protozoa, on peptones and polypeptides. According to Schoen, who studied fermentation, some yeasts and

bacteria fail to accomplish the full range of fermentation of which their enzymes should make them capable. Such failure is attributed to circumstances which render one or more of the enzymes functionless, or eliminate them altogether.
While admitting that functions can be lost, and organs responsible for them disappear, the author cites several authorities in support of the view that such loss or disappearance is only one aspect of an evolutionary process still little understood, and is not necessarily to be interpreted as degeneration. He also cites authorities whose evidence is said to refute the hypothesis of Lwoff that the order of evolutionary descent is from chlorophytes to leucophytes, and then to protozoa. I. Z.

697. Hohlov, S. S. 576.16:575.3
(Centres of origin, or the geographical foci of species formation).
Botaničeskii Žurnal (J. Bot. U.R.S.S.). 1947 : **32** : 33–41.

In a previous paper (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1632), I. S. Travin put forward the theory that new species originate in small areas where geological changes in the earth's crust have recently occurred.
The author of the present paper criticizes this theory, on the grounds that it is contrary to Darwin's theory of the origin of species and to the principles of dialectical materialism. He holds that geological activity cannot be the only, or even the main, cause of species formation; and that the areas in which species originate are not necessarily small areas containing the richest variety of forms.
In the author's view, large and not small areas provide the conditions necessary for the formation of new species, since they possess a greater variety of environmental conditions than smaller areas, to produce variation within a species, whose population is spreading over the area. The plants of a species spread from the centre outwards, and from the periphery inwards, variation being acquired as generation after generation passes from one environment to another different environment. During the process of natural selection, those variations which are conducive to the most rapid rate of propagation, and therefore to the most rapid rate of distribution through the greatest possible range of environmental conditions, will impart the highest degree of adaptability.
The occurrence of variations caused by the physical environment does not, however, ensure evolution. Evolution is the result of the influence of natural selection upon the population which is growing in density. Thus variations are caused by the physical environment, but evolution is regarded as independent of the physical environment.
It is further postulated that during the course of migration across a large area, species concentrate at certain points, especially along the periphery; the author calls these points foci. An area may contain one or more such foci. At these foci a greater variability of forms is to be found than in other parts of the main area; and as the result of hybridization new species may arise. The foci are thus secondary centres of speciation. It is thought that the regions where these foci are most likely to occur are not in isolated mountain areas, but in the broken terrain formed at the junction of extensive level areas and the foothills of mountain ranges.

*CYTOLOGY 576.3

698. Saez, F. A. 576.312
La naturaleza química de los cromosomas y del nucleolo. (**The chemical nature of the chromosomes and the nucleolus**).
Bol. Soc. Argent. Bot. 1945 : **1** : 4–35.

A review in Spanish is presented of recent work on the constitution of the nucleoproteins, the changes that these undergo during the nuclear cycle, heterochromatin, and the similarities between genes and viruses.

699. Horváth, J. 576.312:576.35
The question of the equality of somatic and germ nuclei in respect to heredity and survival, on the basis of studies in a soil protozoon.
Arch. Biol. Hung. 1947 : **17** : Ser. II : 193–202.

On the basis of the results of experiments on amicronucleate forms of *Kahlia simplex*

* General studies, see also individual crops.

Horváth obtained by ultra-violet treatment, the author expresses the view that the macronucleus has the same status as the micronucleus in respect to inheritance and reproduction. It was found that the amicronucleate forms could be cultured indefinitely and did not show the dying out reported by other workers on amicrocnucleate ciliates, and that these forms were capable of endomixis and conjugation.

700. Kosswig, C. and
Shengün, A. 576.312.31
Intraindividual variability of chromosome IV of *Chironomus*.
J. Hered. 1947 : **38** : 235–39.

Variability in the chromatic pattern of giant chromosome IV of *Chironomus* was observed in different tissues and in the same tissue.

The authors consider that it is necessary to revise the generally accepted view that the chromatic discs are stable and constant; they suggest instead that these discs merely represent regions of a special type of activity or inactivity along the chromosome, the pattern of which is conditioned by the function of the cell. They further suggest that the discs of giant chromosomes cannot provide exact knowledge of the locus of a particular gene under all conditions. Their observations on the development of the giant chromosomes of *Chironomus* and other Diptera support the view that the discs are formed secondarily after the coiling of the chromosome.

701. Hovanitz, W. 576.312.34
An electron microscope study of isolated chromosomes.
Genetics 1947 : **32** : 500–04.

It is found that chromosomes from the resting nuclei of chicken red blood cells show a definite spiral structure without apparent chromomeres. In dissolved and precipitated chromosome material, the particles form strands. This phenomenon would seem to be a characteristic of the complete nucleoprotein complex since it does not occur in purified thymus nucleic acid.

702. 576.312.34
Tjio, J. H. 576.312.35
The somatic chromosomes of some tropical plants.
Hereditas, Lund 1948 : **34** : 135–46.

An account is given of the number, size and morphology of the somatic chromosomes of 59 tropical species belonging to the following families: Piperaceae, Sarraceniaceae, Portulacaceae, Lythraceae, Punicaceae, Flacourtiaceae, Myrtaceae, Malvaceae, Euphorbiaceae, Mimosaceae, Papilionaceae, Sapotaceae, Oleaceae, Apocynaceae, Verbenaceae, Acanthaceae, Aroideae, Liliaceae, Araceae, Pandanaceae and Hypoxidaceae. Reference is made to observations by other workers. The cytology of some of the species has not been investigated previously.

703. Sirks, M. J. 576.312.34:575.17
Het chromosoom als genencomplex. (**The chromosome as gene complex**).
Vakbl. Biol. 1941 : No. 12 : 200–10.

The lecturer briefly recapitulated the history of the discovery of the chromosomes, their structure and identification as carriers of genes, and the probable identity of chromosomes and genes. He then turned to their chemical composition and the structure of nuleicc acids and albumins, and discussed the probable dimensions of such molecules and of genes, and the theories advanced recently regarding the chemical composition of the genes, paying special attention to the conclusions reached by Caspersson and Janssen which suggest that thymonucleic acid may act as a prosthetic chain to the polypeptide chains forming the chromosomes. C. B.

704. Quintanilha, A. and
Cabral, A. 576.312.35
A new species of Liliaceae with six somatic chromosomes.
S. Afr. J. Sci. 1947 : **43** : 167–70.

The chromosome number of *Ornithogalum virens* Lindl. is reported to be $2n = 6$.

705. Felföldy, L. J. M. 576.312.35:581.5(43.91)
Chromosome numbers of certain Hungarian plants.
Arch. Biol. Hung. 1947 : **17** : Ser. II : 101–03.
Cytogeographical work was begun in Hungary during the war. The present paper gives a table summarizing the results of investigations on the chromosome numbers of some species growing in different plant societies on the peninsula of Tihany, Lake Balaton. The species examined include: *Festuca pseudovina* (Hack.) Beck., $2n = 28$; *Bromus commutatus* Schrad., $2n = 14$; *B. tectorum* L., $2n = 14$; *Papaver Rhoeas* L., $n = 7$; *Sinapsis arvensis* L., $n = 9$; *Fragaria collina* Ehrh. (syn. *F. viridis* Duchesne), $2n = 14$; *Helianthemum ovatum* (Viv.) Dun. f. *typicum* Beck., $2n = 20$; *Salvia aethiopis* L., $2n = 24$; *Valeriana dioica* L., $2n = 16$; and 12 other miscellaneous species.

706. 576.312.36:537.531:535.61–31
Swanson, C. P. 576.312.341
X-ray and ultraviolet studies on pollen tube chromosomes. II. The quadripartite structure of the prophase chromosomes of *Tradescantia*.
Proc. Nat. Acad. Sci. Wash. 1947 : **33** : 229–32.
The different types of induced breakages in chromosomes are discussed. A number of aberrations recently discovered in pollen tube chromosomes of *Tradescantia* following X-ray or ultra-violet treatment must be interpreted as half-chromatid breaks and rearrangements. The quadripartite structure of the chromosomes has, moreover, been directly observed in the centric region of the pollen tube chromosomes. The behaviour of the chromatid as the functional unit is considered in the light of this evidence.

707. Giles, N. H. (jun.) 576.312.36:539.16
Chromosome structural changes in *Tradescantia* microspores produced by absorbed radiophosphorus.
Proc. Nat. Acad. Sci. Wash. 1947 : **33** : 283–87.
The chromosomal aberrations produced in the microspore nuclei of *Tradescantia paludosa* by radioactive phosphorus were found to be similar to those caused by X-irradiation.

708. Zamith, A. Paes Leme 576.35
Apontamentos sôbre mitose e meiose., (**Notes on mitosis and meiosis**).
Rev. Agric. Brazil 1946 : **21** : 391–402.
Descriptions and figures are given of the processes of mitosis and meiosis.

709. Steinegger, E. and
Levan, A. 576.353:581.04:635.25
The c-mitotic qualities of colchicine, trimethyl colchicinic acid and two phenanthrene derivatives.
Hereditas, Lund 1948 : **34** : 193–203.
The results of experiments to determine the effects of colchicine, trimethyl colchicinic acid, 3-oxymethylene-4-keto-tetrahydrophenanthrene and 3-methoxymethylene-4-keto-tetrahydrophenanthrene on mitosis in onion root tips are recorded, and a discussion is presented on the possibility of distinguishing those c-mitotic substances with an unspecific physical effect from those which have, in addition, a specific chemical action.

710. Oksala, T. 576.354.4
The concept and mechanics of chromosome reduction.
Hereditas, Lund 1948 : **34** : 104–12.
The question of whether reduction occurs at the first or the second meiotic division, and the significance of this, are discussed with reference to various organisms.

711. 576.354.4:575.247:581.143.24
576.356:581.04:575.17
576.356.5:581.143.32:575.114.3
HUSKINS, C. L. 577.8:576.12
Chromosome multiplication and reduction in somatic tissues. Their possible relation to differentiation, "reversion" and sex.
Nature, Lond. 1948 : **161** : 80–83.

A discussion is presented of the occurrence of polyploid cells in various animal and plant tissues and of the relation between chromosome substance and genes.
The occurrence of meiotic divisions in *Allium* root tips treated with sodium ribose nucleate, as well as in differentiated tissues is reported. It is considered that the sodium nucleate treatment merely increased the frequency of a process which occurs naturally without treatment. Reasons are given why occasional meiotic divisions in normal tissues would not usually be observed. Cases of somatic segregation and of somatic crossing-over may, it is thought, be attributable to the occurrence of meioses in which the second divisions are abortive, a phenomenon which may also have significance with respect to "saltation" in fungi lacking known sexual stages and perhaps bacteria. It is suggested also that cancer may be caused not by somatic mutation, but by somatic segregation in an organism heterozygous for a gene or genes governing predisposition to tumour susceptibility. The observations reported are of interest also in connexion with cases of genome segregation in allopolyploids, and attempts will be made to extract ancestral species from polyploids; this may have some bearing on the problem of relict species.
It is argued that the gene must be, in some sense, a multiple unit "since its microscopically visible habitat, the chromatid, is at least double", and in the light of this consideration and the observations reported in this paper, the concept of the gene as a protein molecule composed of a number of identical lamellae or platelets, acting as a physiological unit through reproducing these platelets, is discussed. Polyploidy is considered with reference to this concept. Mutations originating in single platelets might be expected to lead to the occasional occurrence of mosaicism.
It is contended that endomitosis, complementary mutations, somatic reductions and fusion of reduced nuclei, all of which occur in normal material are sufficient to account, theoretically at least, for all the basic cytogenetic and evolutionary features of sex.

712. MEIER, R. and
SCHÄR, B. 576.354.4:581.04
Différenciation de l'action antimitotique sur la cellule animale normale, *in vitro*. (**Differentiation of the antimitotic action on the normal animal cell, *in vitro*).**
Experientia, Basel 1947 : **3** : 358–66.

The literature on the chemical inhibition of cell division is briefly reviewed. An investigation is reported of the action on the fibroblasts of the fowl of various different substances such as mustard oil, crotonic aldehyde, organic derivatives of mercury, cationic soaps, quinones, etc. which have an antimitotic effect.

713. LORZ, A. P. 576.356
Supernumerary chromonemal reproductions : polytene chromosomes, endomitosis, multiple chromosome complexes, polysomaty.
Bot. Rev. 1947 : **13** : 597–624.

A review is given of investigations on polytene chromosomes, endomitosis, multiple chromosome complexes and polysomaty in Diptera and other insects and in various plant species. A bibliography of 69 references is appended.

714. D'AMATO, F. 576.356:581.04:635.25
The effect of colchicine and ethylene glycol on sticky chromosomes in *Allium cepa*.
Hereditas, Lund 1948 : **34** : 83–103.

The effect of colchicine and of ethylene glycol on the mitosis of cells containing sticky chromosomes in root tips of *Allium Cepa* is described.

715. DEYSSON, G. 576.356:581.04:635.25
Action mitoclasique de la boldine. (**Mitoclasic action of boldine.**)
Bull. Soc. Bot. Fr. 1946 : **93** : 370–73.
Boldine has an inhibitory effect on mitosis in *Allium Cepa*. Its principal effect is to inhibit phragmoplast formation, thereby leading to the formation of binucleate cells.

716. FÁBIÁN, G. and
MATOLTSY, A. H. 576.356.1:581.04
The effect of 3-4 benzpyrene in respect to the non-disjunction frequency in *Drosophila melanogaster*.
Arch. Biol. Hung. 1947 : **17** : Ser. II : 171–78.
Benzpyrene added to the food of *Drosophila* and absorbed from the body into the eggs was found to diminish the frequency of non-disjunction in the X chromosome.

717. CROUSE, H. V. 576.356.2
Chromosome evolution in *Sciara*.
J. Hered. 1947 : **38** : 279–88.
Evidence is given demonstrating the occurrence of terminal inversion in chromosome C of the salivary gland nuclei of *S. ocellaris*, and of the derivation of the segmental sequence in chromosome C of *S Reynoldii* from that of *S. ocellaris* by the process of terminal inversion.

718. FRÖST, S. 576.356.4
B and ring chromosomes in *Centaurea scabiosa*.
Hereditas, Lund 1948 : **34** : 255–56.
The presence of accessory chromosomes in *C. scabiosa* is reported and their meiotic behaviour described. In one plant, a varying number of normal chromosomes formed rings at mitosis.

719. WITTE, M. B. 576.356.5
A comparative cytological study of three species of the *Chenopodiaceae*.
Bull. Torrey Bot. Cl. 1947 : **74** : 443–52.
Tetraploid cells were observed in the outer layer of the periblem and in the dermatogen of root tips of *Atriplex patula* and *Chenopodium album*, and in the outer layer of the periblem of *Kochia trichophylla*. In the periblem of *A. patula* octoploid cells were also observed. In all three species polysomaty was the result of double chromosome reduplication in the resting stage.

720. 576.356.5:575:633
LEVAN, A. 575.243:633
Kromosomavdelningen. (**The Chromosome Division**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 327–35.
This is a survey of the work of the Chromosome Division of the Swedish Seed Association from 1936 to 1946. The stimulus given to the production of polyploid economic and other plants by the colchicine technique is emphasized, with detailed observations on the advantages of the methods and the modifications that are necessary in applying it to dicotyledons and monocotyledons, especially the grasses, and to biennials and perennials.
That polyploids obtained experimentally are not of direct practical value is due to their genetically unbalanced condition as compared with the well balanced genotypes of the older crop plants.
Some of the new polyploids of species such as clover, beet, white mustard, show vigour and larger leaves, seeds, etc., but such plants may also be more susceptible to certain fungous diseases and defective in fertility.
Different genotypes of the same plant react differently to increased chromosome number, and polyploids of several types of each group of plant material should be produced for study and use in breeding by hybridization. Examples of successful "secondary" improvement of this kind are cited from Müntzing's work on flax and other experiments with white mustard, both of which exemplify the improvement attainable in seed setting, which is usually deficient in the different types of polyploids. Moreover, some crop plants, e.g.

flax, are less suitable for polyploidization than others, e.g. white mustard, of which the best tetraploids equal the diploids in value.
Criteria for suitability for polyploidizatiou are stated, with examples of crop plants that have been proved to fill these requirements.
The point has now been reached in Swedish research on polyploidy when intensive work on specially promising kinds of plants can be recommended, with as its basis an abundant collection of primary material.
A table is included of crop plants in which induced polyploid forms have been obtained.

721. 576.356.5:575:633
TURESSON, G. 576.356.5:581.04
Kromosomfördubbling och växtförädling. (**Chromosome doubling and plant breeding**).
Weibulls Ill. Årsb. 1946 : **41** : 16–23.

An account is given of the importance of colchicine treatment to obtain polyploid forms of economic plants, with examples from the recent work at Weibullsholm, Sweden, with tetraploid forms produced by the Swedish Agricultural College [Lantbrukshögskolan]. The performance of diploid and tetraploid varieties or strains of different clover species, turnip rape, and white mustard is compared in a series of tables showing yields.
Judging from the clovers from the Agricultural College, the tetraploid forms seem to be more drought resistant.
The tetraploids of the two turnip rapes, Mette and Hunsrücker, were defective in fertility and consequently in seed production, but their seed, as in white mustard, is half as big as the seed of the parent forms; thus if the fertility of the tetraploids can be increased to the level of the parents, a good increase in yield should result. In the case of white mustard, selection for high seed production has been effective among tetraploid forms and even the "crude" unimproved tetraploids have shown an increased fertility which can doubtless be accelerated by selection.

722. GUSTAFSSON, Å. 576.356.5:576.12
Polyploidy, life-form and vegetative reproduction.
Hereditas, Lund 1948 : **34** : 1–22.

Data are presented on the rate of polyploidy in groups of plants belonging to various habitats, and the occurrence of polyploidy is considered in relation to various plant characteristics in 38 Scandinavian genera. The facts are interpreted as evidence that the chromosome numbers of Angiosperms show a marked correspondence to life form, growth habit and vegetative reproduction. This correspondence is discussed from an evolutionary standpoint.

723. GYÖRFFY, B. 576.356.5:581.04
Die Colchicinmethode zur Erzeugung polyploider Pflanzen. (**The colchicine method of producing polyploid plants**).
Züchter 1940 : **12** : 139–49.

The colchicine method for inducing polyploidy in plants is discussed. The author does not claim that the results obtained in tests are always easily applicable to agricultural plant breeding.
The reduced fertility and slower development often observed in induced polyploids in comparison with their diploid parents are not due to the treatment with colchicine, but largely the result of the autopolyploid condition. The choice of suitable parents, crossing and subsequent selection go far in eliminating these difficulties.
The colchicine treatment, its method of application and action are explained. The treatment of the seed was tried out on *Datura* and *Linum*, and the treatment of shoots on *Tradescantia*, *Linum* and *Hyoscyamus*. Buds and very young embryos should not be treated with colchicine if this can be avoided.
The characteristics of plants which have undergone successful treatment are discussed and shown in illustrations, and the main abnormalities likely to occur are described.
The article contains a bibliography and a list of colchicine-induced polyploids. E. M. F.

724. PIROVANO, A. 576.356.5:581.04
Anomalie in *Gerbera Jamesoni* prodotte dalla colchicina. (**Anomalies in *G. Jamesoni* produced by colchicine**).
Riv. Soc. Toscana Orticultura **1946** : **31** : 144–46.
Treatment of young cotyledons with a 2% colchicine solution in cotton wool in 4–5 applications produced a marked stunting of the growth in certain individuals, and in others various floral anomalies, which are described. Some are thought to be due to sectorial polyploidy.

SEXUALITY 577.8

725. SARBADHIKARI, P. C. 577.8
The cytological aspects of the nature of sex in plants.
Ceylon J. Sci. **1947** : **12** : 203–10.
A general analysis is given of the nature of sexuality in the lower and higher plants.

726. 577.8:633
[**Sex from a genetical point of view. (Discussion at a Round Table conference on October 13, 1938**)].
Bot. and Zool. **1939** : **7** : 322–31.
The introduction to this report of a round table conference records a discussion on sex determination. The rest of the report is concerned with the following contributions on sex from the genetical standpoint:—
H. Terao suggested that it might be possible to find sex-linked physiological characters, e.g. chemotaxis, galvanotaxis, in wheat and some other plants.
H. Kihara referred to his findings regarding the possible causes underlying sex determination in *Melandrium*, hemp and *Papaya*.
M. Yamazaki then reported that, according to Yamanaka of Saipan sex diagnosis in *Papaya* can be based on the reaction of the plants to potassium chlorate, female seedlings being more resistant than males. This result was confirmed by Shisa (Sisa).
Yamazaki, the originator of this method of diagnosis, records, however, that in hemp (in which sex reversal also may occur) and spinach the male plants are more resistant than the female ones.
K. Shimamura found the same condition in *Ginkgo*, but records that Yamamoto found the opposite relationship in strawberries, which H. Kihara explains as due to the fact that the female strawberry plants are heterozygous and therefore stronger.
K. Shinoto (Sinotô) referred to the difference in pH value in the stigma and anthers of *Rumex*, *Cannabis* and spinach. Similarly the pH of seeds of dioecious plants are known to vary with sex, variety, etc.
S. Makino, Y. Tanaka, and H. Kihara then discussed sex chromosomes and their morphological features: the possibility of autosomes changing into sex chromosomes was mentioned.
The conference concluded by a discussion on sex diagnosis.

727. NOVITSKI, E. 577.88:576.312.332
Genetic analyses of an anomalous sex ratio condition in *Drosophila affinis*.
Genetics **1947** : **32** : 526–34.
An investigation of the genetical constitution of certain males of *D. affinis* which produce only male offspring shows that they possess the "sex ratio" X chromosome, which ordinarily causes males carrying it to produce only daughters, and also a recessive gene *a*, on chromosome B, in the homozygous condition. In the presence of a Y autosome translocation in a male, the normal sex ratio occurs in the offspring. The geographical distribution of the sex ratio X chromosome and of *a* are indicated. The evolutionary significance of factors governing aberrant sex ratios is discussed.

MICROSCOPIC TECHNIQUE 578.6

728. ZIRKLE, C. 578.6
Some synthetic resins in combined fixing, staining and mounting media.
Stain Technol. **1947** : **22** : 87–97.
The use of Rezyl 7020, Amberol 750 and Bakelite BR-7160 as media for the combined

purpose of fixing, staining and mounting, is described. The use of lacto-gelatin as a mounting medium is also discussed; carmine fades in lacto-gelatin but the latter can be used when the specimen is stained in orcein.

729. ZUCK, R. K. 578.6
Simplified permanent aceto-carmine smears with a water-miscible mountant.
Stain Technol. 1947 : **22** : 109–10.

The commercial preparation Clearcol, a medium consisting of a mixture of plastics and solvents, gives a clear non-crystalline preparation upon evaporation of its volatile constituents. Dehydration and clearing are therefore rendered unnecessary. Clearcol has considerable permanence; and its refractive index is approximately the same as that of balsam.

*BOTANY 58

730. 58:007(43)
582
Report on the state of taxonomic botany and botanical collection in some areas of Germany since 1939.
British Intelligence Objectives Sub-Committee, London 1946 : Final Rep. No. 1520. Item No. 22. Trip No. 2681 : Pp. 191. (Mimeographed).

In this report, an account is given of the state of botanical facilities at the principal German research centres. Appendices list botanical literature published in Germany during the War, new species of higher plants described in the same period, and information on the whereabouts of German botanists.

731. BARNÓTHY, J. and
FORRÓ, M. 581.03:537.59
Lethal effect of cosmic ray showers on the progeny of animals.
Experientia, Basel 1948 : **4** : 31–33.

Cascade showers of cosmic rays generated by 16 mm. of lead have been shown to have a lethal effect on the progenies of rabbits and mice.

732. HAVAS, L. J. 581.04
L'action de la colchicine, administrée seule ou en combinaison avec des hormones sur la croissance et sur le développement des embryons de la grenouille. (**The action of colchicine, administered alone or in combination with hormones, on the growth and development of frog larvae**).
Arch. Biol. Hung. 1947 : **17** : Ser. II : 149–56.

It is shown that the influence of colchicine on tadpoles of *Rana fusca* is not limited to the well-known mitotic effect of this drug.

733. 581.143.32:581.04:576.356.5(43.91)
HAVAS, L. J. and FELFÖLDY, L. J. M. 581.143.32:576.12
Fasciations and kindred teratisms induced in plants by polyploidogenic agents.
Arch. Biol. Hung. 1947 : **17** : Ser. II : 131–40.

Descriptions are given of fasciation and similar teratological conditions induced by treatment with colchicine, acenaphthene, benzpyrene and other polyploidizing agents in wheat, *Taraxacum officinale*, tomato, *Phaseolus vulgaris* and *Pelargonium*. In addition, inoculation with *Bacterium tumefaciens* was carried out with *Pelargonium*. The various forms of fasciation observed were mostly associated with tumefaction and polyploidy, but some cases were noted which were not accompanied by tumour formation or polyploidy.
The mechanism of fasciation is discussed. It is suggested that a physico-chemical injury brought about by the chemical treatment and effecting a "grafting by approach" at the surface of contact of roots or shoots is a cause of fasciation and similar teratological conditions.

* General studies, see also individual crops.

The general evolutionary significance of the occurrence of endemic and serial teratological conditions, such as have been observed in *Taraxacum*, and the oak in the forests of Felsögalla, is briefly discussed. Attention is drawn to the evolutionary significance of coincidences of "inner disposition" and environmental stimuli, similar to these teratological conditions, which through a series of sensitizations and so-called micro-mutations may lead to mutations proper. Burbank is given as the authority for the view that plants with the greatest variability are those which offer the greatest possibilities to the plant breeder; in the authors' view plants that respond most readily to polyploidizing and other agents, producing teratological conditions with or without polyploidy, fall within this category.

734. 581.162.32:633.41
581.162.32:633.15

BATEMAN, A. J.

Contamination of seed crops.

Heredity 1947 : **1** : 235–46.

A study is presented of the influence of distance in reducing cross-pollination in beet and maize. In both crops, the rate of decrease in contamination steadily decreases as the isolation distance increases. It is concluded that the isolation distances necessary for wind-pollinated crops are similar to those required by insect-pollinated crops. The greater buoyancy of the pollen of grasses could be allowed for by increasing the size of plots liable to contamination.

735. SANZ B-M, C. 581.331.23:575.127.5

Comportamiento de los tubos polonicos en tentativas de cruzamientos. (**The behaviour of pollen tubes in attempts at hybridization**).

Agric. Tec. Chile 1946 : **6** : 5–11.

It has been found that the pollen of a number of members of the Solanaceae will germinate on the stigmas of *Datura Stramonium*, and also, though to a lesser degree, the pollen of representatives of quite unrelated families.

GENERAL AGRONOMY 631

736. SOSNIN, A. V. 631.421:575:633(47)

(**Assessing methods of determining yield on breeding plots**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 37–39.

The yields of a number of varieties calculated from small breeding plots were compared with the yields of the same varieties in field tests on plots of 50 m.^{2} in four replications. The breeding plots were sown with 200 grains of each variety in two replications, with the standard between each two varieties. Four different methods of sowing were adopted, (1) in ten 1 m. rows, 12·5 cm.* apart, with 5 cm. between plants, (2) in rows 12·5 cm. apart with 2.5 cm. between plants, (3) in one 8 m. row, with 5 cm. between plants and 18 cm. between rows, and (4) in one 4½ m. row, with 5 cm. between plants and 18 cm. between rows.

The first method gave the best correlation with the field results but in no case was the correlation high. The yields from the whole plot gave the only reliable result, yields per plant, per ear or per straw being more often than not misleading.

737. 631.421:633.00.14

Verslag van de gecombineerde vergadering van de Studiekringen voor Proeftechniek en Plantenveredeling. (**Report of combined meeting of the study circles for experimental methods and plant breeding**).

Landbouwk. Tijdschr. Wageningen 1946 : **58** : 457–67.

Dorst, J. C. *Moet de kweker ter beoordeling van nieuwe rassen zijn kracht zoeken in variëren van omstandigheden of in herhalingen?* (*Should the breeder rely on varying the conditions or on replication in evaluating a new variety*). (*pp.* 457–64).

The thesis was advanced that varying the conditions under which a variety is tested is of greater value than replication, especially when the material available is limited. Usually

* 125 cm. in text.

in field experiments efforts are made to ensure the utmost possible uniformity, even to the extent of allowing for the weight and germination percentage of the seed sown in variety trials. Many varieties show to the best advantage only when their peculiarities are indulged, and then replication of uniform conditions is merely replication of a mistake for such varieties. From his own experience he supported this thesis with examples from trials for wheat, potatoes and flax, and advocated the use of different levels of manures, or seed rate, or times of sowing, or even different localities, instead of replication at least in the early trials when a breeder should be trying to learn about the behaviour of a new variety in varying circumstances. Later, if the variety shows up well for some years, then replication may be desirable. No fault lies in the science of field experimentation but rather in the workers who misapply it. Particularly in the case of potatoes actual yield figures contribute little to the final decision, in comparison with the other characteristics, such as shape, depth of eyes and susceptibility to diseases.

A lively discussion was carried on after the lecture chiefly between Wellensiek and the lecturer, the former pointing out that by reducing the size of the trial plots commonly used, replication could be achieved without sacrificing varying conditions of manuring, etc.

Koopman. *Grafische proefveldverwerking.* (*Evaluation of field experiment results by graphic methods*). (*p.* 465).

In this discussion, it was pointed out that economy in labour is most important in carrying out field trials. Long narrow plots are easier and quicker to sow than square ones. The size of the plot will vary with the crop, e.g. for cereals 10 sq. m. (5 rows 25 cm. apart and 8 m. long) is suitable. For resistance trials, 6 sq. m. are used. In most cases the variety is dropped without recording the yield. In laying out, attention must be paid to direction of drains and fertility gradients. For first year trials no replication is used, for second year three, third year, five or six, and fourth year five or six replications, but in the last case with two controls.

The graphical evaluation of the result was demonstrated with examples from fodder beet.

Hamming. *Problemen bij het samenvatten van rassenproeven.* (*Problems in summarizing variety trials*). (*pp.* 466–67).

A mathematical dissertation was given on the question as to what constitutes a reliabl. theory of error. The use of interaction variance, in the absence of replication, for the *z* test was deprecated. C. Be

738. Bonvicini, M. 631.521.5(45)
Il problema delle sementi. (**The problem of seeds**).
Ital. Agric. 1946 : **83** : 250–52.

The author urges the necessity of an adequate system of registration of new varieties of crop plants and of controlling the purity and quantity of the seed put on the market.

739. Montanari, V. 631.521.5(45)
Considerazioni generali sul problema semenziero. (**General considerations on the seed question**).
Agricoltura Venezie 1947 : **1** : 261–71.

The natural advantages of Italy as a seed producing country are mentioned and the various measures, legal and otherwise, necessary for ensuring the quality of the product, are discussed. Proposals are made for a system aiming at the control of both production and quality.

740. Johnson, L. P. V. 631.521.5:578.08
Embryonic reaction to sodium biselenite as a test of seed vitality.
J. Amer. Soc. Agron. 1947 : **39** : 943–47.

Experiments on the sodium biselenite method of seed testing are reported. The method is based on a direct relationship between the intensity of embryonic reaction to sodium biselenite solution and the enzymatic activity within the seed; this enzymatic activity is in

turn presumed to be directly related to seed vitality. It is considered that if the method is suitably adjusted for a given species, the test may be used as an alternative for the standard seed germination tests, and would possess the advantage of saving time if the test could be made early in the after-ripening period; it is also considered that the method has possibilities for use in evaluating the potential seedling vitality of germinable seeds.

741. FRANKEL, O. H. 631.524
Plant collections.
J. Aust. Inst. Agric. Sci. 1947 : **13** : 122–24.
A summary is given of an address delivered to the Australian Institute of Agricultural Science, at Adelaide, August 1946. General aims and possible lines of approach in the highly important work of extensive plant collection are discussed, stress being laid on the need for international co-operation in the various problems entailed.

742. 631.531.12(45)
MONTANARI, V. 635(45)
Le sementi delle Venezie. (**The seeds of the Venetian region**).
Agricoltura Venezie 1947 : **1** : 388–403, 586–601, 759–84.
Data are given concerning the production of selected seed of a wide range of crop plants and vegetables in the Venetian region, of the chief varieties grown and their main characteristics. The region lends itself well to the production of seed and recommendations are made for increasing the scale and efficiency of the work.

743. PUHALJSKIĬ, A. V. 631.531.12(47)
(**Elite seed producing farms for grain crops**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 16–25.
The efforts to increase the supply of élite seed, the production of which had been neglected during the war years, in different parts of the U.S.S.R. are described. A system of prizes for those farms that attain or exceed the quota has been introduced. For every pood* of élite grain given up the grower is entitled to receive 1 pood, 20 lb. of common grain for consumption. Various defects are pointed out, such as insufficiency of trained staff and of agricultural machines and other equipment, and others of an organization nature.

744. DIDUSJ, V. I. 631.531.12:575.42:575.148
(**Raising the yields of élites**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 3–5.
The author holds that the present system of seed production in the U.S.S.R. is unsatisfactory, as it aims at maintaining the level of a variety rather than improving it. He recommends that each year the best plants in the multiplication plots should be selected and the seed from them should form part of the seed that goes to produce the super-élites. In this way a perpetual improvement in the variety should be effected. When no further improvement accrues from this method intravarietal crossing should be introduced.

745. ANODIN, P. S. 631.531.12:578.08(47)
(**Seed production at the Novyĭ Urenj State Breeding Station**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 11–12.
In the last three years the seed of winter rye, winter wheat, peas and lentils issued by the Novyĭ Urenj station in the Uljanov province of the U.S.S.R. has been of 100% purity and has given considerably higher yields than those obtained from ordinary seed of the same varieties. The methods employed comprise continuous selection, training the plants by growing under optimum conditions, and intravarietal crossing.

* 1 pood = 36 lb.

746. Petuhov, Bobrov, Sattarov, and Černov. 631.531.12:578.08(47)
(The scheme of seed production).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : p. 8.

A letter signed by the directors of the seed production farms of the Mari, Udmurt and Tartar autonomous republics in the U.S.S.R. stresses the desirability of leaving the early stages of seed production in the hands of the experiment stations, which have the necessary facilities, rather than the collective farms. A note from the editor disagrees with this point of view on the grounds that such an organization would not provide seed material adapted to the special soil and climatic conditions of the places where it is to be sown.

747. Šeluhin, I. S. 631.531.12:578.08(47)
(Growing élite seeds in Siberia).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 9–10.

Cases are cited in which yield differences of up to 30% have been recorded between crops grown from élite and from ordinary seed, others in which no difference at all has been observed. These latter cases usually occur when the seed requirements are too large to permit the research station to exercise the necessary supervision of all the stages of seed production. A system is described in which élite seed is produced in Siberia in five or four stages, according to the demand. These are: (1) selection plot, where seed of the heaviest fraction, with high energy and percentage of germination is sown and the best plants are chosen at harvest time, giving rise to (2) the seed plot, sown by drill and subjected to negative selection, i.e. roguing, giving rise to (3) a seed multiplication plot, seed from which gives the (4) super-élite, which gives (5) the élite plot. Where the demand is small stage (3) may be omitted.

748. Skalozubova, A. N. 631.531.12:578.08(47)
(The scheme of élite production in Southern Siberia).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 6–7.

Seed production plots sown by hand have, under the conditions of Eastern Siberia, suffered excessive damage from pests and diseases, and a scheme is suggested in which the seed for all five stages, selection plot, mother plants, seed plants, super-élite and élite plots are all sown by drill under optimum conditions, approximating as far as possible to those existing in practice.
Intravarietal crossing is also applied.

749. Vorona, G. B. 631.531.12:581.48
(The quality of seed of agricultural crops).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 48–50.

Figures are given which show that in both cereals and legumes, plants arising from large seeds gave higher yields than those from small seeds, the difference in some cases amounting to as much as 2 c. per ha.; 1000 corn weight is therefore regarded as a character that should be taken into account in assessing seed value.

750. Skripčinskiĭ, V. V. 631.962.4:576.12
(Dynamics of varietal purity in winter wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 43–45.

No renewal of seed material took place in the wheat varieties Kooperatorka and Ukrainka during the years 1930, 1931, 1932 and 1933 in the Stavropolje area of the U.S.S.R. and figures for varietal purity show very little change either in the percentage or the type of impurity found in Kooperatorka; the varietal purity of Ukrainka fell gradually from 97·999 in 1930 to 95·908 in 1933.
The bearing of these results on Lysenko's principle of intraspecific competition (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 585) is indicated.

751. LAMPRECHT, H. 632–1.521.6:575:633:575.116.1
Växtsjukdomar och växtförädling. (**Plant diseases and plant breeding**).
Weibulls Ill. Årsb. 1946 : **41** : 23–27.

The different ways in which diseases in plants may be caused and the methods of combating them are concisely outlined. In breeding for resistant forms, account must be taken of several different causes, physical, chemical or genetical, that may underlie resistance to disease, e.g. in the club root resistant turnip Immuna II (cf. *Plant Breeding Abstracts*, Vol. XVI, Absts 602 and 1303). A difficulty occurs when resistance depends upon a substance whose presence or absence is decisive with regard to quality and also to infection, e.g. tannic acid content in wild apples which is correlated with scab resistance but also with low quality. A further example of such unwelcome correlations is cited from the work that has been going on for some years at Weibullsholm on the possible relation between mustard oil content in new strains of turnips and swedes and their resistance to some diseases. Mustard oil gives the roots an unpleasant flavour, but its absence may possibly involve greater susceptibility to disease (cf. Abst. 1006).

Though more difficult than the problem of resistance to fungi, solutions need not be despaired of with regard to resistance to pests; and even in deficiency diseases, plant breeding may be of assistance in cases where variation in tolerance is known to exist, e.g. grey spot of oats due to manganese deficiency.

The breeding methods suitable to such problems as the above are briefly indicated.

752. CHIARUGI, A. 632–1.521.6:633
L'eredità in patologia vegetale. (**Heredity in pathology**).
IV Congr. Intern. Patologia Comparata, Roma 1939 : **17** : 155–210.

In this general exposé of the interrelations between genetics and plant pathology, the many genetic and cytological phenomena which may affect the life of the plant adversely are discussed in considerable detail. These include deleterious and lethal mutants, a variety of chromosome irregularities, the many chlorophyll deficiencies now known in various plants, genes causing sterility, and others causing various morphological anomalies, all of which are described by reference to the genetical literature. Unstable genes are considered in two categories, mutable genes and labile genes, and are regarded as throwing light on the chemical nature of the gene and of its changes and affording a very direct link between genetic and pathological phenomena.

After a brief reference to the question of disease resistance, the work on the genetics of the pathogenic organisms themselves is mentioned, showing that from the point of view of pathology it is the interplay of the two that is decisive. The different types of resistance and of immunity and the manner in which they are inherited are analysed and instances of the production of resistant strains of agricultural plants are cited from the literature of plant breeding; these include many cases where selection alone has been successful, others where hybridization has been necessary. In this latter connexion the importance of the centres of diversity of the cultivated plant species as a possible source of resistant genes is indicated, reference being made to the South American potato species, the disease resistant wheats of the Hindu Kush, Kostov's production of *Triticum timococcum*, Hope and Thatcher wheat in America, the Java sugar canes and Harland's insect resistant cotton derived from crosses with *Gossypium tomentosum*.

753. LEWIS, I. F. and
WALTON, L. 632.2:581.143.24
Initiation of the cone gall of witch hazel.
Science 1947 : **106** : 419–20.

A substance which initiates, stimulates and directs the development and differentiation of cells has been discovered in the cone gall of *Hamamelis virginica* L. A brief account is given of its injection into the young leaf by the aphid *Hormaphis hamamelidis* Fitch, its mode of action and its effects.

---

* General studies, see also individual crops.

754. Nutini, L. G.,
Kelly, T. A. and
McDowell, M. A. 632.3:535.61–31:575.243
Effect of *Staphylococcus aureus* extracts on various bacteria.
J. Bact. 1946 : **51** : 533–38.
The inhibitory action on test organisms of both broth extracts and filtrates from *S. aureus* cultures was slightly modified by ultraviolet irradiation of the cultures.

755. Braun, W. 632.3:575.24
Dissociation in *Brucella abortus;* A demonstration of the role of inherent and environmental factors in bacterial variation.
J. Bact. 1946 : **51** : 327–49.
The existence of inherent differences between clones of *B. abortus*, strain 19, in regard to dissociation percentages under standardized environmental conditions is reported. Bacterial dissociation is interpreted in terms of the spontaneous appearance of mutants and their subsequent establishment under the control of the inherent and environmental factors which govern population dynamics.

756. Edwards, P. R. 632.3:575.24
The segregation of antigens in a bacterial culture by an undescribed form of variation.
J. Bact. 1946 : **51** : 523–29.
Two distinct and apparently stable loss variants of *Salmonella hormaechei* are described. They had no major H antigens in common but, in combination, possessed all the antigens of the parent culture. The possible bearing of this hitherto undescribed form of variation on the origin of *Salmonella* types is briefly discussed.

757. Sears, H. J. 632.3:575.24
Survival for fourteen years of agar slant cultures of *Escherichia colimutabile* without loss of important characters.
J. Bact. 1946 : **51** : 553–58.
The ability or lack of ability of two strains of *E. coli-mutabile* and of the lactose-fermenting variant derived from one of them to produce variants on lactose media was retained among other characters after 14 years storage at room temperature.

758. Yegian, D.,
Budd, V. and
Middlebrook, G. 632.3:575.24
Biologic changes in sulfonamide-resistant *Mycobacterium ranae*.
J. Bact. 1946 : **51** : 479–85.
A sulphonamide-resistant strain of *M. ranae* differing from the parent susceptible strain in growth rate, discoloration of the medium, production of diazotizable arylamine and other characters is described. It is regarded as a true and stable mutant.

759. Zamenhof, S. 632.3:575.24
Studies on bacterial mutability: The time of appearance of the mutant in *Escherichia coli*.
J. Bact. 1946 : **51** : 351–61.
A study of the delay in the occurrence of bacterial mutants in *E. coli* leads to the following conclusions: (1) given an adequate number of mother cells, there is no delay in the occurrence of the first mutant cell; (2) the slow multiplication of the mutant and its early descendants accounts for the delay in the detection of the mutation; and (3), one pure mother strain may give rise to entire gamuts of mutants which differ in their degree of citrate utilization and probably also in their degree of resistance to inhibitory factors.

760. KUSHNICK, T.,
RANDLES, C. I.,
GRAY, C. T. and
BIRKELAND, J. M. 632.3:575.242
Variants of *Escherichia coli, Pseudomonas aeruginosa,* and *Bacillus subtilis* requiring streptomycin.
Science 1947 : **106** : 587–88.

It is reported that some strains of *E. coli, Ps. aeruginosa* and *B. subtilis,* after having developed resistance to streptomycin, grew better and more rapidly in the presence of this substance. The results obtained when these strains were grown on various media can be explained on the hypothesis that the *E. coli* and *Ps. aeruginosa* variants consisted of a mixture of resistant and streptomycin requiring strains, while the *B. subtilis* streptomycin consisted almost completely of a population requiring this antibiotic.

761. 632.3:575.242
LEDERBERG, J. 632.3:575.11
Gene recombination and linked segregations in *Escherichia coli.*
Genetics 1947 : **32** : 505–25.

A study of the recombination of genetic factors in *E. coli* and their segregation into prototroph recombinants has provided evidence in support of the sexual basis of factor recombination and of the existence of genes arranged in linear order. Each of the 15 factors studied fell into the same linkage group. A tentative 8-point genetic map of the chromosome is presented.

762. WYSS, O. and
STONE, W. S. 632.3:575.243:537.53
Induced mutations in bacteria.
J. Bact. 1947 : **54** : p. 4. (Abst.)

The induction of mutations is reported by growing bacteria on substrates previously exposed to radiations. Quantitative aspects of the mutation phenomenon on different substrates give some indications as to the chemical nature of the substance involved in genetic control. A possibility of directing mutation was detected.

763. KELNER, A. 632.3:575.243:537.531
X-ray-induced mutations of *Actinomyces flaveolus.*
J. Bact. 1947 : **54** : p. 31. (Abst.)

Among the survivors of irradiated suspensions of conidia in saline the following types of mutants were found: biochemically deficient strains which grew well on nutrient agar but very poorly or not at all on asparagine glucose agar; strains with more intense pigmentation than the wild type or with different pigmentation; and asporogenous strains. The percentage of such mutants among the survivors increased as the X-ray dose was increased.

764. NUTMAN, P. S. 632.3:575.246
Variation within strains of clover nodule bacteria in the size of nodule produced and in the "effectivity" of the symbiosis.
J. Bact. 1946 : **51** : 411–32.

An effective strain A and an ineffective strain B of *Rhizobium trifolii* are compared as regards influence of passage through the host legume and of storage in the soil and on agar medium upon symbiotic behaviour. After storage of strain A in sterilized Woburn sandy soil, a considerable percentage of ineffective variants, resembling the parent type in cultural and serological characters, were found in the bacterial population. After the passage of these ineffective variants through the plant, two reversions to the effective parent type were found among the 13,400 nodules examined. These remained effective on further plant passage.

An occasional tendency to produce new variants in effectivity and in type of growth on agar was noted in stock cultures of both effective and ineffective types.

The variability of clover plants as regards response to a given strain of bacteria is being investigated on genetical lines.

765. KNAYSI, G. and
BAKER, R. F. 632.3:576.312.1
Demonstration with the electron microscope, of a nucleus in *Bacillus mycoides* grown in a nitrogen free medium.
J. Bact. 1947 : **54** : p. 4. (Abst.)
Nuclei were observed in the germ cells and subsequent generations of vegetative cells of *B. mycoides*. They are large and opaque and show evidence of division; they do not appear to divide by simple constriction.

766. KNAYSI, G. 632.3:576.312.3
Further observations on the nuclear material of the bacterial cell.
J. Bact. 1946 : **51** : 177–80.
It was found by subjecting microcultures of strain C_3 of *Bacillus cereus* to the Feulgen reaction that the nuclear material of this strain is diffuse both in the vegetative cell and in the young endospore. Differentiation of a nucleus may occur during maturation of the spore.

767. SIMMONDS, S.,
TATUM, E. L. and
FRUTON, J. S. 632.3:577.1:575.243
The utilization of leucine derivatives by a mutant strain of *Escherichia coli*.
J. Biol. Chem. 1947 : **170** : 483–89.
Experiments were carried out to study the utilization of derivatives of leucine by an X-ray induced mutant strain of *E. coli* which requires leucine and threonine for growth. All the leucine peptides tested were found to serve as growth substances for the mutant strain. Acetylleucine, however, did not prove to be an active factor for growth, although it minimized the leucine requirement of the strain. Derivatives of dehydroleucine did not provide active growth substances, nor did they minimize the requirement of leucine.

768. ALPATOV, V. V. 632.3:581.4:577.15
(The morphological inversion of organisms, and its chemical basis).
Priroda (Nature) 1947 : No. 4 : 49–50.
The author describes experiments conducted by himself and Nastjukova, and others by Gauze, the results of which suggest that the more usual laevo-rotary colonies of *Bacillus mycoides* and the rarer dextro-rotary colonies owe their contrasting forms to two isomers of an enzyme. Other examples of contrasting forms are being sought in the plant and animal world with the purpose of discovering what relationship exists between the morphological characters of an organism and any optically active chemical substances which it may contain. I. Z.

769. 632.3–2.8–1.521.6:535.61–31:575.243
LURIA, S. E. 632.8:575.17
Reactivation of irradiated bacteriophage by transfer of self-reproducing units.
Proc. Nat. Acad. Sci. Wash. 1947 : **33** : 253–64.
Evidence is presented for the presence of lethal mutations as the cause of inactivation of bacteriophages by ultra-violet irradiation. The bacterial host strain of the bacteriophages used was *Escherichia coli* B.
It appears that a bacteriophage may consist of a series of self-duplicating units, any one of which may undergo lethal mutation. Moreover, these units multiply in such a way, that should two phages, each bearing a single lethal mutation but at different loci, infect a bacterium, a reactivated phage will result. The significance of this independent reproduction of phage components is discussed. It appears that a virus particle is comparable to a gene complex rather than to an individual gene.

770. Diller, V. M.,
Tytell, A. A. and
Kersten, H. 632.421.2:575.242:537.531:576.312
Biochemical studies of a soft X-ray mutant of *Aspergillus niger* Van Tieghem.
J. Bact. 1947 : **54** : 274–75.

"Nutrition studies have been made on a soft X-ray mutant of *Aspergillus niger* van Tieghem. The mutant is stimulated 240 per cent by biotin as against 70 per cent for the normal. Hypoxanthine, inositol, and *p*-aminobenzoic acid stimulate the mutant 140 to 200 per cent as against 10 to 50 per cent for the control. Pyridoxine, pimelic acid, riboflavin, thymine, guanine, niacin, and cytosine stimulated the mutant 40 to 75 per cent but did not stimulate the normal.

Analyses of the lanthanum-precipitable fractions indicated that the mutant nucleic acid content was at least 25 per cent lower (on a dry weight basis) than the normal. This was confirmed by spectrophotometric data".

771. Diller, V. M.,
Tytell, A. A. and
Kersten, H. 632.421.2:575.243:537.531
Mutation of *Aspergillus niger* Van Tieghem by means of soft X-rays.
J. Bact. 1946 : **51** : p. 404. (Abst.)

A mutant of *A. niger* differing from the original culture in appearance, in growth characteristics and in metabolism was obtained by irradiation with soft X-rays.

772. Hanson, H. J.,
Myers, W. G.,
Stahly, G. L. and
Birkeland, J. M. 632.421.2:575.243:539.185.9
Variation in *Penicillium notatum* induced by the bombardment of spores with neutrons.
J. Bact. 1946 : **51** : 9–18.

An account is given of the induction of variation in *P. notatum* No. 17 by bombardment with neutrons. One hundred and fifty variants were isolated and studied. The ways in which they varied from the parent strain are described.

773. Hockenhull, D. 632.421.2:575.243:581.04:578.08
Mustard-gas mutation in *Aspergillus nidulans*.
Nature, Lond. 1948 : **161** : p. 100.

The production of various types of mutations in cultures of *A. nidulans* by exposing them to mustard gas vapour is reported. The mutants included strains deficient for cystine. A technique for isolating these strains is described.

774. Emerson, S. 632.421.9:575.242:581.143.26:575.113.6
Growth responses of a sulfonamide-requiring mutant strain of *Neurospora*.
J. Bact. 1947 : **54** : 195–207.

The growth responses to sulphonamides, to temperature and to *p*-aminobenzoic acid of the mutant strain E-15172 of *N. crassa* are described. "Reversions" to the growth rate and habit of the wild type were encountered and crosses from such "reverted" cultures generally showed that "reversion" had been accompanied by mutation at a locus distinct from that responsible for sulphonamide requirement. It is concluded that these mutations are not strictly reversions but suppressions of the effects of one gene by another. A double mutant was obtained which carried the gene for sulphonamide requirement and a gene for the failure of synthesis of *p*-aminobenzoic acid.

The significance of the results is discussed.

775. McAulay, A. L. and
Ford, J. M. 632.421.9:575.243:535.61–31
Saltant production in the fungus *Chaetomium globosum* by ultra-violet light, and its relation to absorption processes.
Heredity 1947 : **1** : 247–57.

An investigation is reported of the production of the K saltant in *C. globosum* at a wavelength near the threshold for its production and of the way in which the frequency of production of this and other saltants varies with wave length. It was found that more than three times as many K's as all the other saltants put together are produced at short wavelengths whereas few are produced by 3132 A.U. and 3342 A.U. and practically none by 3656 A.U. and 4047 A.U.

Two separate features of the results are inconsistent with the theory that mutant production by ultra-violet irradiation is due to absorption of the radiation in nucleic acid. These are (1) the selective effect just described and (2) the nature of the curve connecting the reciprocal of dose for optimum saltant production with wave length as compared with the nucleic acid absorption curve. The results can be simply explained by a protein absorption theory. The effect of screening in changing the shape of the curve connecting reciprocal dose with wavelength is discussed.

776. 632.421.9:576.312.35:581.162
Hirsch, H. E. 632.421.9:576.354.4
Cytological phenomena and sex in *Hypomyces solani* f. *cucurbitae*.
Proc. Nat. Acad. Sci. Wash. 1947 : **33** : 268–70.

The cytological basis for the sexual behaviour of the fungus *H. Solani* f. *Cucurbitae* S. et H. is explained. The haploid chromosome number may be 2, 3 or 4.

777. Doermann, A. H. 632.421.9:577.1:575.243
A lysineless mutant of *Neurospora* and its inhibition by arginine.
Arch. Biochem. 1944 : **5** : 373–84.

An induced mutant strain of *Neurospora*, designated No. 4545, requires lysine for normal growth. The mutant differs from the wild type by a single gene which is located on the first chromosome. The growth of the mutant was inhibited when the molecular ratio of arginine to lysine approached a critical value. A molecular ratio of approximately one, under usual conditions of culture, reduced the growth of the mutant to one half of that in the arginine-free control culture; growth was completely inhibited if this ratio was doubled.

778. Horowitz, N. H. 632.421.9:577.1:575.243
Methionine synthesis in *Neurospora*. The isolation of cystathionine.
J. Biol. Chem. 1947 : **171** : 255–64.

Up to the present, mutants of *Neurospora* unable to synthesise methionine have occurred 87 times in investigations at the William G. Kerchhoff Laboratories of the Biological Sciences, California Institute of Technology, Pasadena. The mutants have arisen as the result of treating wild type spores with mustard gas and high frequency radiations. In many of the mutants, failure of methionine synthesis is caused by a block in the reduction of sulphate; such strains can utilize reduced forms of inorganic sulphur for growth, as well as methionine and other organic sulphur compounds. Some of the mutants, however, require organically bound sulphur for growth, indicating that in these strains the block in methionine synthesis occurs at a later stage than sulphate reduction. The present paper describes four of the strains which are unable to carry out certain of the final stages of methionine synthesis. Each biochemical mutant depends upon the mutation of a single gene. The mutants are referred to as *methionineless*–1, *methionineless*–2, *methionineless*–3, and *methionineless*–4, respectively, abbreviated as *me*–1, *me*–2, *me*–3 and *me*–4; the same numbers also indicate the distinguishing gene of each strain. Strains *me*–1, *me*–3 and *me*–4 were obtained as the result of ultra-violet treatment; *me*–2 was isolated from material exposed to X-rays.

Evidence was obtained suggesting that the synthesis of methionine in *Neurospora* proceeds through a series of gene-controlled stages involving cysteine, cystathionine and homocysteine as intermediate products. The synthesis of methionine is blocked at a different stage in each mutant. Strain *me*–4 can utilize cystine, cystathionine and homocysteine for

growth, in addition to methionine. Strain *me*–3 can utilize cystathionine, homocysteine, but not cystine. Strain *me*–2 is able to grow on homocysteine or methionine, but not on cystine and cystathionine; strain *me*–1 utilizes only methionine.
The substance produced by mutant *me*–2, which was active for *me*–3 and *me*–4 but not for *me*–2 or *me*–1, was isolated and identified as *l*-cystathionine by several methods.

779. 632.422.3:575.243:581.04
LINDEGREN, C. C. and 632.422.3:575.11
LINDEGREN, G. 632.422.3:575.061.6
Depletion mutation in *Saccharomyces*.
Proc. Nat. Acad. Sci. Wash. 1947 : **33** : 314–18.

An account is given of genetical studies of *S. cerevisiae* colonies in which mutations had been induced by treatment with mustard gas. The hypothesis put forward to explain the facts requires the presence of a gene substance X which, together with certain other substances, produces a pink colour but which may become exhausted so that a pink colony reverts to white without the occurrence of a true mutation. A new supply of the substance can be introduced by outcrossing to any normal stock.

780. WINGE, Ö. 632.422.3:576.356:575.114
The segregation in the ascus of *Saccharomycodes Ludwigii*.
C.R. Lab. Carlsberg Sér. Physiol. 1947 : **24** : 223–26.

An account and explanation are presented of the characteristic arrangement of the spores with respect to their genetical constitution in the ascus of *S. Ludwigii*.

781. SUBRAMANIAM, M. K. 632.422.3:581.1:575.24
Bottom and top yeasts.
Sci. and Cult. 1946 : **12** : 217–19.

The literature on the differences between top yeast and bottom yeast and the transformation of one type into the other is reviewed. In view of the recent discovery of a top yeast as a mutant in active cultures of a brewery strain treated for 90 days with acenaphthene (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 517), it is suggested that some of the cases of transformation of one type of yeast into the other may be due to chromosome mutations.

782. RUIZ ORONOZ, M. 632.422.3:582
Estudio de una nueva especie de levadura del género *Rhodotorula* Harrison, aislada del néctar de las flores de *Martynia fragrans*. (**Study of a new yeast species of the genus *Rhodotorula* Harrison isolated from the nectar of the flowers of *M. fragrans*).**
An. Inst. Biol. Univ. Méx. 1947 : **18** : 25–41.

A new yeast species *Rh. Martyniae-fragrantis* has been isolated from the nectar of the flowers of *M. fragrans*. Its behaviour on various cultural media is indicated.

783. OORT, A. J. P. 632.451.2:576.16:633.11:575
Stuifbrand specialisatie, een probleem voor den kweker. Onderzoekingen over stuifbrand, III. (**Specialization of loose smut of wheat, a problem for the breeder. Researches on smut III**).
Tijdschr. PlZiekt. 1947 : **53** : 25–43.

Specialization of *Ustilago Tritici* into biotypes is less than that of rust fungi. Breeders must bear in mind this specialization when choosing parents and must use a number of biotypes. This raises the following questions: which biotypes occur in the country? How can they be distinguished? Are they constant? How do new biotypes occur? Can the breeder work with a mixture of biotypes? What varieties are most suitable as parents?
The author considers that three complexes of factors determine the relationship between host and parasite. The first of these is "spreading susceptibility" which includes susceptibility and sensitivity. If the spreading velocity is low, the parasite may fail to reach the growing point in time; the plant remains healthy and immune. Secondly, the host may or may not tolerate the parasite. If it tolerates it, the plant is provisionally indistinguishable from a healthy plant (eusymbiosis). If the host will not tolerate the fungus, a struggle ensues (parabiosis). The plants become sick and may even die; alternatively the plant may recover and bear normal seed. The plant may thus be hypersensitive.

Comparison of eusymbiosis and parabiosis shows the following paradoxes: normal, apparently healthy plants, may produce smutted ears; extremely sick plants, if they survive, may produce healthy ears.
If eusymbiosis results in the crop being severely attacked, parabiosis protects it. Although the plant is susceptible, the crop is healthy (field resistant).
Lastly, ear resistance can occur, e.g. only a few spikelets are affected due to late development of resistance. Smut is easily overlooked in Chanteclair because of this. Only a few varieties show it.
These complexes are highly specific for varieties and biotypes.
The susceptibility of several varieties to six biotypes is discussed. The biotypes appear to be constant. Working with mixtures of biotypes is dangerous, as a true susceptibility of 80 90% may be reduced to an apparent susceptibility of 20-30%. It is better to use separate biotypes in successive years. Carstens V is very resistant to smut and Juliana to yellow rust. Two varieties can be used as parents if one is susceptible to one or more biotypes to which the other is resistant. C. B.

784. FISCHER, G. W. 632.451.2:577.8
Multiple sex factors in *Ustilago striiformis* f. *hordei*.
Phytopathology 1947 : **37** : 843–44. (Abst.)
The occurrence of six distinct sex groups is reported in 46 cultures of *U. striiformis* f. *Hordei*.

785. THUNG, T. H. 632.8
Antagonistische acties van viren. I. (**Antagonistic actions of viruses. I**).
Tijdschr. PlZiekt. 1947 : **53** : 43–48.
The antagonistic action of different viruses inoculated into the same plant is discussed in the light of present knowledge. Special attention is devoted to the problems of (1) predominance of one virus over the other in relation to their strength or weakness; (2) multiplication; (3) propagation; and (4) the independence of the phenomena (1), (2) and (3).
A further article on the subject will appear later.

786. JONES, M. A. and 632.951.1:581.192(72.95)
PAGÁN, C. 632.951.1–1.421(72.95)
A comparison of three varieties of *Derris elliptica*.
Trop. Agriculture, Trin. 1946 : **23** : 76–80.
Experiments were carried out at the Federal Experiment Station, Mayaguez, Puerto Rico, on the varieties Sarawak Creeping, Changi No. 3 (Rio Piedras clone) and St. Croix. The Changi No. 3 variety was definitely inferior in important respects to both Sarawak Creeping and St. Croix. Row plots were found to be more satisfactory than block plots. Correlations between the results of chemical estimations of quality are given, useful for the purposes of varietal sampling.

787. HERMANN, F. J. 632.951.1:582
Studies in *Lonchocarpus* and related genera, I: A synopsis of *Willardia*.
J. Wash. Acad. Sci. 1947 : **37** : 427–30.
A new taxonomic scheme for the genus *Willardia* is presented. Three species are transferred to this genus from *Lonchocarpus*.

ECONOMIC PLANTS 633

788. ISLENTJEV, N. V. 633(47)
(**The Talov variety testing plot in the Voronež province**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos **9–10** : **50–54**.
After a description of the agricultural methods used on the variety testing plot, some remarks are given regarding the behaviour of the main varieties of winter wheat, oats, barley, pea, *Lathyrus*, lentil and millet, with indications also of their main defects.

789. 633(82)
Semillas originales. (**Stock seeds**).
Cat. Criad. Argent. Plantas Agric. Enrique Klein 1946 : Pp. 40.
Details are given of the qualities and genetic origin of the wheat, oat, barley, rye, flax, maize, sunflower and Sudan grass varieties of the Criadero Klein, Argentina.

790. Said, H. 633:581.04:576.356.5(62)
Plant reactions to colchicine treatment.
Proc. Egypt. Acad. Sci. 1945 : **1** : 49–59.
The results of treating the seeds of cotton, fenugreek (*Trigonella Foenum-graecum*), lupin, bean and radish with colchicine are reported. The seeds were soaked in solutions varying in concentration of colchicine from 0·0125% to 20%, for periods varying from four to 50 hours. The effects of the treatment upon the cytology, morphology, histology and yield of the plants are described.

791. Drachoussoff, V. 633:581.6(67.5)
Essai sur l'agriculture indigène au Bas-Congo. (**Essay on the native agriculture in the Lower Congo**).
Bull. Agric. Congo Belge 1947 : **38** : 783–86.
A table giving the vernacular names, origin, range and method of cultivation and general characteristics of species and varieties of crop plants grown in Bangu and Inkisi is included.

792. Voĭtonis, V. Ju. 633–1.524(47)
(**The varietal resources of the Tuva province**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 71–72.
The Tuva autonomous province is a region of high mountains, up to 2 km. above sea level, and deep valleys, characterized by extreme variations of temperature. Special local forms of a great number of familar plants exist there; they tend to be characterized by cold and drought resistance, early maturity, and tolerance of sharp temperature changes and provide a promising source of plant breeding material. An expedition was sent in 1945 to study and collect the local forms of cultivated plants. Hundreds of hectares of wild yellow lucerne were found, and proved to be high quality and suitable for use as seed. The local wheat was unusually high in baking quality, yield and earliness and other interesting material collected included a number of forms of herbage grasses, millet and cucurbits.

793. Belousov, V. [Belusov, V.] 633–1.531.12(47)
Seed selection and cultivation in the Soviet Union.
Fertil. Feed. St. J. 1947 : **33** : 749–50.
A brief account is given of seed selection and propagation in the Soviet Union.

794. Steyaert, R. L. 633–2–1.521.6:575(67.5)
Plant protection in the Belgian Congo.
Sci. Mon., Lond. 1946 : **63** : 268–80.
Reference is made to the work of A. Beirnaert in oil palm breeding. Selection of strains of *Coffea canephora* Pierre by the Dutch and the planting of some of these strains in the Belgian Congo are also referred to. Efforts to select cotton strains resistant to the fungi *Nematospora Coryli* Reg. and *Ashbya Gossypii* (A. et N.) Guill. and selection for resistance to *Fusarium vasinfectum* Atk. are described.
In oil palms, the genetical heterogeneity is not conducive to widespread infestations of particular pests and diseases. The possible influence of selection in increasing the economic importance of pests not prominent at present is being guarded against.
The breeding of blight resistant potato varieties is discussed.

795. Packard, C. M.,
Bayles, B. B. and
Aamodt, O. S. 633–2.7–1.521.6:575(73)
Crops that resist insects.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 648–50.
A brief survey is given of work in the United States on insect resistance in wheat, maize and other crops.

796. 633.00.14(41)

Guide to Boghall Experimental Farm.

Edinb. and E. Scot. Coll. Agric., Edinburgh 1947 : Pp. 40.

A guide is presented to the trial and demonstration plots of cereals, grasses, legumes and other crops grown in 1947 at the Boghall Experimental Farm, the Edinburgh and East of Scotland College of Agriculture. Notes are included on the cereal varieties grown on the farm.

797. Sosnin, I. V. 633.00.14(47)

(**Neglect in varietal distribution in Kazahstan**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 55–57.

The present system of testing crop varieties for suitability for cultivation in different zones of Kazahstan is said to be inadequate. It may retard the introduction of superior varieties, or result in the cultivation of several varieties in adjacent zones when a single one would be suitable.

798. Salonen, M. 633.00.14(47.1)

Berättelse över Finska Mosskulturföreningens verksamhet år 1945. (**Report on the work of the Finnish Association for Bogland Cultivation in 1945**).

Finska MosskFören. Årsb. 1946 : **50** : 5–12.

In recording particulars of the organization of the Association and the work accomplished at the Leteensuo and Karelian Experimental Stations during the year, it is announced that owing to the bad economic conditions it is not possible to publish the year book of the Association in Swedish as well as Finnish, but Swedish members will receive abstracts in Swedish of all articles and Swedish translations, of headings, names of varieties etc. in any tabular matter.

Publication of the yearbooks for 1944 and 1945 which have not yet been issued in Swedish is also promised.

A few variety trials were included in the 35 experiments conducted at Leteensuo, while at the Karelian Station it was possible to carry out 20 trials of varieties and species.

799. 633.00.14(48.9)

Beretning fra Statens Planteavlsudvalg for Finansaaret 1942–43, 1943–44. (**Report of the State Committee for Plant Culture for the financial year 1942-43, 1943-44**).

København 1943 : Pp. 113; 1944 : Pp. 84.

Both reports, following the same plan as preceding issues (cf. Absts 190, 212 and 525) contain *inter alia* information on the composition of the Danish Committee for Plant Culture and its work at various experimental stations, on local observations on fruit varieties, and on the research programmes discussed for 1943–44 and 1944–45.

In the 1943–44 report, discussions and decisions affecting work on the following crops were briefly recorded: wheat varieties, Jubilé [Jubilee] in particular; horse beans and chicory strains and their purity.

In the 1944–45 report, plans regarding the following came up for discussion: wheat and rye trials; fodder beet trials with 25 strains, without storage tests, though incidentally, a possible correlation between high dry matter content and good keeping capacity in sugar beets was suggested; trials of oil plants, including oil radish (thought to be equal to rape in oil yield), and poppy; tests of some new strawberry hybrids derived from crosses comprising the variety Mangefold which has both good and bad points; and trials of strains of Brussels sprouts, and of red and white cabbage.

An amendment to the rules for variety and strain trials of vegetables was adopted, whereby, in cases of disagreement regarding the naming of the variety, the owner must accept the experimental findings.

800. RASMUSSEN, L. 633.00.14(48.9)
Beretning om Sorts- og Stammeforsøg. (**Report on variety and strain trials**).
Beretn. Planteavl. Lolland-Falster 1942 : 131–49; also Beretn. Planteavl. Sjaelland 1942 (1943) : 191–208.

The constitution is set out of the Provincial Committee formed in December 1934 to introduce more uniform regulations regarding the testing of varieties and strains in local trials. The rules were published in 1935.

Details are recorded of wheat variety trials in Denmark as a whole, in the islands and Jutland. Winter hardiness was among the characters studied. The Danish varieties included Øtofte 103 and Øtofte 3.

Barley trials were conducted with Abed Maja and Svalöf Freja.

The peas tested included Abed Marmor and Øtofte Marmor.

Maize from Chiemgau and a Danish seed firm was tested together with barley. Experiments with maize should be continued since yields up to 50 hkg. per ha. were obtained and in one locality the maize even outyielded the barley.

Fodder beets, swedes and sugar beets were tested, observations being recorded on off-colour types, diseased plants including those affected by dry rot, and dry matter content of the tops.

CEREALS 633.1

801. 633.1:575(47)
Soviet scientists develop new grain varieties.
Soviet News 1948 : No. 1861 : p. 2.

It is briefly reported that 20 new grain varieties have been developed in the last twelve months by Soviet scientists. In the dry steppes of Kazahstan drought resistant wheats are now being cultivated on a large scale. A new variety of winter wheat developed by scientists in this region yields 4–5 cwt more than other varieties grown in the steppes. New cereal varieties have also been obtained for cultivation in the Ukraine and Siberia.

802. VESTERGAARD, H. A. B. 633.1:575(48.9)
Abed Planteavlsstation. (**Abed Station for Plant Cultivation**).
Beretn. Planteavl. Lolland-Falster 1940 (1941) : 3–12.

Wheat

Mention is made of wheat trials held at Abed (Lolland) and other island stations in Denmark from 1936 to 1940 and particulars are given here of the trials of 9 wheats in 1939–40 at the Abed Station.

The average grain yields (relative figures) for 1936–40 for four island stations were for Lawaetz Als, 99; Trifolium Rekord, 100; Abed Borg [Abed Castle], 100; Abed No. 32, 101, and Pajbjerg Ideal, 98.

In the 1940 trials, Trifolium Rekord was the least winter hardy and Weibulls Aering II most so.

Als showed most tendency to lodging and Konge [King] the least. Abed 32 and Skandia had a slightly higher hectolitre weight than the rest, while the differences in grain size were a little more marked, Borg, Ideal, and Skandia having slightly larger grains than the rest, and Rekord the smallest. Als yielded most straw, and Konge, least.

Holme-Hansen's report on local trials on Lolland-Falster in 1940 shows that the hardiest varieties did best, though, normally, winter damage scarcely occurs. Jubilé seems to be very nearly equal to Rekord in hardiness.

In the last few years, crosses were made of Abed No. 32, Skandia and Aering, on the one hand, with the two varieties just mentioned and the variety Benoit on the other, the object being to combine adequate hardiness with approximately the same stiffness of straw as the foreign varieties gave. Some line cultures of Joncquois have been raised from 500 ears from a stand that had been subjected to sevère winter conditions.

Oats

In trials at Abed, the oats, Nos 30 and 8, both from Ørn [Eagle] x Sølv [Silver], gave the highest yield of grain. No. 30 has medium long straw, which, like the grain, is of good

quality, but the straw is not stiff enough. No. 8 has a good long straw and very large grain but again, the straw is not stiff enough. The performance of these two varieties and of Abed No. 17 which resisted lodging in various Danish trials is referred to (cf. Abst. 812). No. 17, whose grain is white with a greyish brown tinge, showed 1% more husk than the common varieties, but 2–3% less than the Sort fransk Havre [Black French Oat], and is remarkable for the fact that the golden spikelet so often found at the bottom of the oat panicle in the common varieties, is absent. In 1941 multiplication from pure seed of the variety is to begin under the name Minor.

In 1940 control experiments were laid down with 60 new lines, derived mainly from hybridization of Abed Nos 66 and 77, Ørn, or Guldregen [Golden Rain] with Abed Minor. In 1941, plots of 23 lines from this experiment were laid out to observe yields, quality and stiffness of straw.

In the view of Pesola, some of the oat varieties from southern Scandinavia are too late for many northern and central districts. The Danish variety No. 17, might therefore be tried, as it is earlier and stiffer strawed than varieties from more southerly regions, hitherto used in Finland.

Barley

Trials of hybrids between Kenia and Maja, with the two parent varieties for comparison, were conducted at various centres in 1939 and 1940. In spite of the severe drought conditions, the number of new lines or varieties that needed to be retained could be reduced to four or five. Available evidence suggests that most of the new lines had stiffer straw than Maja and a few even equalled Kenia in this respect. Speaking generally, it seems unlikely that any of the new lines will surpass Maja in yield, but a few may surpass Kenia, and of these, some may also equal or exceed Kenia in straw stiffness and quality. Multiplication of one or two of the new varieties may be begun in 1941.

O. Glaerum (Myistad) reports very good performances by the Danish two-rowed barleys, Binder, Opal B, Kenia, and Maja, in trials in Norway, where hitherto only six-rowed barleys have been used for grain production or even malting. Binder has long grown also in Finland where it is highly thought of as a malting barley, so the newer Danish varieties too might well be suited to Finnish conditions.

Sugar beet

A brief note is given on trials in 1937 and 1938 with eight Danish strains, one Swedish and one German strain, with the sugar mangel Tystoft VII as the control for yield of roots, sugar percentage, bolting and the amount of tops produced.

803. VESTERGAARD, H. A. B. 633.1:575(48.9
Abed Planteavlsstation. (**Abed Station for Plant Cultivation**).
Beretn. Planteavl. Lolland-Falster 1941 : 1–13.

Wheat

The same varieties were tested as in 1940 (cf. Abst. 802), and subsequently, a new line of Abed No. 32, which had proved winter hardy. Severe weather damaged the stands and yields were lower than in 1940.

A considerable number of line cultures mainly from crosses of older Scandinavian varieties stood the winter well and selected lines were again planted in the autumn. The most interesting are some hybrids from crosses made a few years ago of our northern varieties and the Belgian wheat Jubilé and the French variety Joncquois.

These populations and some crosses made in 1941 will be used in an attempt to combine stiffness of straw and yield with adequate winter hardiness for Denmark. Certain changes are to be made in the method of selecting lines in such populations. Out of 500 lines of Joncquois that overwintered successfully in 1940 only a few survived this year; these will be further tested in 1941–42.

Barley

Kenia, Maja and the Abed Nos 43, 108, 359, 369, 372 and 389, all six of which are derived from crosses made between Kenia and Maja to combine the latter's yield with Kenia's stiff straw and quality were included in the large scale trials. The results are not discussed but it is stated that one of the new lines is undergoing further breeding.

Breeding was continued with many new lines from 10 different pairs of parents and 150 lines have been selected for further study in 1942 and 1943.
A small control experiment has been planned with some recent Swedish and German varieties and some new lines of Abed No. 43 (Kenia x Maja) and Abed No. 154 (Kenia x Sejer). New crosses were made in 1941 between Danish and foreign varieties of special interest, and more will be made in 1942.

Oats

Out of 23 new lines tested with Ørn, Fold, and Minor, the last named being one of the parents of all the new lines, the following lines and varieties were chosen for tests in 1942, with Fold and Minor as controls: Nos 48 and 52 (from Abed No. 66 x Minor), Nos 120, 148 and 155 (from Guldregn x Minor), and Nos 205, 206 and 236 (from Ørn x Minor). The eight new forms differ greatly in a number of features. The most promising in the 1942 trials will be tested in local and possibly also in the national trials.
Minor is an early oat of good quality, with good stiff straw, and is best suited to soils naturally rich in nitrogen.
Breeding operations in 1941 included new lines from various crosses, including among other varieties, Fold and Argus.
The breeding of spring oats and barley is to be extended in 1942 with more crosses than usual to provide material for future work.
In all, 1000 new lines, double lines and populations of spring cereals will be planted in 1942.
The name of the Svalöf oat Sol has been changed to Fold in Denmark, as from November 1941.

804. VESTERGAARD, H. A. B. 633.1:575(48.9)
Abed Planteavlsstation. (**Abed Station for Plant Cultivation**).
Beretn. Planteavl. Lolland-Falster 1942 : 3–16.

Wheat

Winter-killing of wheat was widespread in 1942 at Abed, Denmark, and in some parts of the country even rye was damaged, a very rare occurrence in Denmark.
Most of the hybrid lines of Aering, Bort, etc. and some new populations of Jubilé crossed with hardier varieties were destroyed by the severe winter.

Oats

Trials of the new oat varieties showed good stands and no lodging. The average yield of grain was 43 kg. per ha. as compared with 34 kg. in the previous year. Fold and Minor were used as standards, the former replacing Ørn [Eagle]. The eight new varieties tested were selected from three crosses, made ten years ago, namely, Abed No. 66, Guldregn II [Golden Rain II], and Ørn, each crossed by Minor, to combine, if possible, its stiffer and shorter straw and some of its other qualitative characteristics with the yield of the other varieties. In view of the fact that the work connected with trials and plant breeding is being transferred to new hands, an exception is made in the current report and the wheat yields are recorded, even though only for the single year 1942.
Most of the new varieties equalled Fold in grain yield; all can be called stiff-strawed.
The variety No. 205 (Ørn x Minor) was outstanding in yield and also had an unusually high hectolitre weight. Nos 120 and 148, both from Guldregn II x Minor, also yielded well, though the latter has rather small yellow grain.
All ten varieties are to be further tested in 1943.

Barley

Trials were carried out at nine stations, eight of which provided the information for the following preliminary survey.
Maja gave the highest yield of grain, and Kenia the lowest. Some new varieties, Nos 369, 108, 359, 389 and 372 from the cross between Kenia and Maja gave intermediate yields. Rigel (named after a star in the constellation of Orion) was only 1% below Maja, but 5% above Kenia which it also surpassed in stiffness of straw; in hectolitre weight and grain size, it also surpassed its parents. It is being multiplied and seed should be ready in quantity after 1944. It is probable that in most cases, with normal humidity and rainfall, Rigel will equal Maja in yield, whereas Maja would probably be slightly superior in drought years. Though continuous increases in the yields through breeding may or may not be possible in regard to

Danish cereals, further progress could be made by breeding types of high baking quality, combining high yield and stiffness of straw, or producing malting barleys, or cereals suitable for groats.

The breeding procedure and the difficulties of selecting suitable parents for crossing and plants with which to start pure line cultivation are discussed, with observations on the numbers of plants and lines that must be raised in the breeding operations and subsequent local trials, and on the precautions necessary in multiplying up a new variety. Induction of mutation and polyploidy are touched upon as subjects for future investigations.

Among the new barley material to be sown in control experiments in 1943 are about 50 lines from eight different hybrid combinations that have been line cultured for the past two years. One of the varieties used in the hybridizations was a form of *Hordeum erectum* which on being crossed with Maja has resulted in a series of lines with an erect spike but considerably shorter straw of a stiffness scarcely likely to be surpassed by any barley variety; their yield under ordinary conditions of cultivation still remains to be estimated, but such types would be of importance on soils where lodging is to be feared.

Present breeding material of barley comprises more recent line cultures, and some crosses made in 1941–42, mainly between the newest Swedish and Danish varieties.

A list is given of varieties bred and released since 1903 in order of their appearance.

Root crops

Figures are given for the comparative yields of dry matter from sugar beets, mangels and swedes, tested at Tystofte and Abed in connexion with the trials held at all Danish stations for the past 11 years.

805. VERVELDE, G. J. 633.1:581.46:631.557
Over de beteekenis der kafnaald bij onze granen. (**The significance of the awns in cereals**).
Meded. LandbHoogesch. Wageningen 1946 : **48** : 35–60.

It has long been thought that bearded races produce larger grains than awnless. Proof of this supposition is, however, difficult. The physiological activity of the awn can be investigated and its effect on the formation of grain deduced, or the effect of the awn can be investigated directly by comparison of awned and, either natural awnless or artificial de-awned races. The main difficulties lie in obtaining comparable plants, haulms, or even spikelets for comparison, and in the wound effect where the awn is removed.

The published data are subjected to a critical survey and results of new experiments are reported. Unfortunately by calculating the standard error of the grain weight on the basis of the number of plants involved instead of the number of grains (a mistake that the author discovered too late) the significance of the results is probably considerably less than it should be.

After a critical discussion of the physiological effect of the awn, the author concludes that it is very probable that awned plants produce a greater weight of grain than awnless plants but that the size of the grain may be less because of the greater number of grains set in awned plants since these have both longer ears and more haulms than awnless plants. Possible reasons for these latter phenomena are discussed.

The work was carried out partly during the war and some of the material is lost. Although not published until 1946, the paper was received for publication in June 1943. C. B.

806. STERNBERG, P. M. 633.1–1.557
(**Cutting the top off grain cereals**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : No. 9–10 : p. 69.

Removal of the upper and lower spikelets in the ear of wheat and barley raised the 1000 grain weight by 50–55 per cent, removal of the whole of one side of the ear increased it by 20–30 per cent and removal of side tillers by only 5–6 per cent.

807. SOKOLOV, A. F. 633.1–2.183–1.556
(**Breeding and machine harvesting of cereals**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 32–33.

Cereal varieties which combine ease of threshing with freedom from shedding, such as the

wheat Erythrospermum 841, are required for mechanical harvesting; also good standing capacity and upright rather than pendent ears. Observations on a number of varieties show that those with small stem diameters may lodge less than those with thicker straw. Uniform height of stem is another important desideratum.

808. MINZ, G. 633.1–2.451.2–1.521.6(56.9)
(Smuts in the Gramineae and methods for their control).
Hassadeh 1946 : **27** : 39–42.

In this article the author gives a general survey of the question according to local and foreign observations and experiments. *Ustilago nigra* was found on barley. C. O.

809. HORNE, F. R. 633.1.00.14(42+42.9)
Spring cereal varieties : recommended lists.
J. Minist. Agric. 1948 : **54** : 450–55.

Information is given on varieties of spring wheat, oats and barley which are recommended as the result of trials carried out by the National Institute of Agricultural Botany, Cambridge.

810. 633.1.00.14(48.1)
Årsberetning fra Norges Landbrukshøgskole for Budsjettåret 1. Juli 1943–30. Juni 1944. **(Annual report from the Norwegian Agricultural College for the financial year 1 July 1943 to 30 June 1944).**
Oslo 1945 : Pp. 168.

Research at the experimental farm during the year included research on experimental and statistical technique and also the following work on special crops:—

Cereals

Variety trials of oats, barley, spring and winter wheat, spring and winter rye, and a comparative study of different species and varieties of spring barleys in regard to methods of cultivation, to quality, etc. were carried out.

Breeding operations, especially with spring and winter wheats, were represented by about 4500 plots. A series of new crosses of spring and autumn wheats and of barleys were made. The new spring wheat Ås II, distributed for multiplication in 1943, is expected to replace the old Ås wheat which it surpasses in most respects; it was derived from the early variety Sibir, the mildew resistant line J 03 and Diamant as well as Ås. Snøgg II [Quick II] also produced by breeding, has been thoroughly tested at Trøndelag and has been multiplied up by the Co-operative Society [Felleskjøpet] there.

Potatoes

Yield trials with potatoes have included observations on all the characters and conditions which determine the value of varieties as table, fodder or industrial tubers. Separate plots were laid down for early, medium late and late varieties.

Other potato problems studied were: the effect of the seed potatoes on yields; the problem of synonyms and the identification of samples of varieties; virus disease, including its effects on yield, dry matter and vitamin C content, and the reaction to different types of viruses and their identification; sowing times for sprouted and unsprouted tubers; the vitamin C content of different varieties and how it is affected by time of harvesting, soil and storage; the technique of determining starch and dry matter content; and the production of new varieties by crossing or selfing.

Root crops

Strain trials were conducted with turnips, swedes, fodder mangels, and sugar beets.

Comparative studies were also made of the capacity of the various root crops to utilize heavy and lighter manuring and liming.

The best times for harvesting were also investigated and the firmness with which the various root crops are rooted in the soil.

Pasture plants

Trials were carried out of clover varieties and strains of timothy, *Dactylis glomerata*, *Festuca pratensis* and *Poa*, and also of various mixtures of herbage crops. Pollen studies of timothy, and breeding work, especially of timothy and other pasture plants, were also carried out.

Other crops

Variety trials of peas and flax included quality and manuring studies.

811. 633.1.00.14(48.9)
633.491.00.14(48.9)
633.00.14(48.9)
Beretning om Landboforeningernes Virksomhed for Planteavlen paa Sjaelland 1940. (**Report on the work of the agricultural associations for plant cultivation in Sjaelland, 1940**).
København 1941 : Pp. 341.

This report contains *inter alia* information on (1) consultants and chairmen of agricultural committees, including their reports; and (2) local field experiments, run by the agricultural associations, and including trials with foreign and some Danish strains of wheat, oats and potatoes.

812. 633.1.00.14(48.9)
HANSEN, H. H. H. 633.4.00.14(48.9)
Lokale Forsøg og andre Planteavlsarbejder. (**Local trials and other work on plant cultivation**).
Beretn. Planteavl. Lolland-Falster 1940 (1941) : 13–73.

This is a brief introductory commentary on methods used in the Danish field trials, 1940, and on the tabulated results of 121 trials with wheat, barley, oats and roots (cf. Abst. 802).

WHEAT 633.11

813. 633.11(45)
40 varietà di grano "registrate" e 57 "ammesse alle prove." (**40 varieties registered and 57 admitted for testing**).
Risicoltura 1941 : **31** : 142–43.

A list is given of wheat varieties recognized, either provisionally or definitively, for cultivation in Italy; plots of these varieties grown for seed are exempt from collection for consumption.

814. 633.11(83)
Semillas genéticas del Ministerio de Agricultura temporada 1945. (**Selected seeds of the Ministry of Agriculture, 1945 season**).
Dep. Genet. Fitotecn. Santiago 1945 : Pp. 32.
Semillas genéticas del Ministerio de Agricultura temporada 1946. (**Selected seeds of the Ministry of Agriculture, 1946 season**).
Ibid. 1946 : Pp. 20.

An account is given of the genetic origins and qualities of Chilean varieties of wheat and a few improved varieties of other crops.

815. NAVOLOCKIĬ, A. V. 633.11:575
(**The spring wheat Pamjatj Urala**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : 13 : Nos 9–10 : p. 68.

The variety has displayed unusual standing capacity and resistance to smut. In baking quality it rivals the best standard variety Tulun 70 B/8 and has exceeded that variety as well as Lutescens 62 and Diamant in yield.

816. BONVICINI, M. 633.11:575(45)
Tre nuove razze di grano. (**Three new races of wheat**).
Ist. Allevament. Veg. Cerealicolt. Bologna 1941 : Pp. 21.

A natural hybrid of the variety 43 found in 1929, segregated in the progeny in such a way as to suggest that Piave was the pollen parent. One line stood out in the succeeding generations and from it a new variety, named Fulvo, was selected. It is of medium height, and the elasticity of the stems enables it to stand well; it is highly resistant to rusts and frost, high in yield even in high altitudes, matures early and produces large grain of good quality.

The variety Florio, a selection from a cross of line 190 x line 380 made in 1931, has thick stems of medium height, exceedingly resistant to rusts, and ears with an average of 4–5 grains per spikelet, in exceptional cases up to 7–8. The variety ripens early and gives a very high yield of good quality grain.
Falcone, a selection from the same cross, is a vigorous, low, rust resistant and early maturing variety which has given exceptionally high yields in fertile soil.

817. VANNUCCINI, G. 633.11:575(45)
I grani Strampelli: "Bruno," "Eia," "Alalà." (**The Strampelli wheats Bruno, Eia and Alalà**).
Ital. Agric. 1943 : **80** : 33–41.

These three wheats are the last varieties to be named by the late Nazareno Strampelli before his death, and are all hybrids of Balilla, the first from a cross with Villa Glori, the last two from a cross with Ardito. All three are awnless, early, short and resistant to lodging and diseases, high in yield and quality, even when grown under relatively unfavourable conditions. Bruno, moreover, tolerates quite late sowing; in normal sowings it has yielded up to 66·6 quintals per ha. in the Italian province of Alessandria.
Descriptions of the three varieties are given, with illustrations.

818. KUČUMOV, P. V. 633.11:575(47)
(**The new variety of spring wheat Narodnyi**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : p. 67.

This new variety of *Triticum durum* has exceeded the standard, Melanopus 69, in yield, by amounts varying from 1 to 6 centners per hectare, in a great number of different localities extending over a considerable area. It is distinguished by resistance to disease and shedding, and by good milling and baking quality.

819. BERG, S. O. 633.11:575(48.5)
Weibulls Original Kärnvårvete. (**A new variety of spring wheat, Weibull's Kärn wheat**).
Weibulls Ill. Årsb. 1946 : **41** : 13–14.

FAJERSSON, F.
Weibulls Original Kärnvårvete II. (**A new variety of spring wheat, Weibull's Kärn wheat II**).
Agri Hortique Genetica, Landskrona 1947 : **5** : 26–45.

The new spring wheat Kärn II [Sturdy II] was bred and tested by the late S.O. Berg of Weibullsholm. It combines with high grain yield and sufficiently early maturity, remarkably good strength of straw and baking quality. Kärn II is a selection from Kärn I whose parents were Extra Kolben x a spring wheat from Halland and Marquis x Hâtive Inversable.
Kärn II has a longer straw than Kärn I but the strength of the straw is slightly less.
Full particulars are given of the performance of the new wheat in trials with other Swedish commercial varieties of spring wheat, e.g. Fylgia, Atle, Brons, Diamant II and Progress.

820. BERG, S. O. 633.11:575(48.5)
Weibulls Virtusvete. (**Weibull's Virtus wheat**).
Agri Hortique Genetica, Landskrona 1946 : **4** : 43–67.

Full particulars are given about the origin and performance of this very winter-hardy, early ripening and high yielding wheat (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 174) which is regarded as an advance in the breeding of wheats suitable for regions with a very severe climate in Sweden. In strength of straw and hectolitre weight it is inferior to its parent Ergo, which it, however, surpasses in earliness and baking quality, though not so good as its pollen parent Svea II in the last mentioned quality.
Virtus has been used as a parent in various crosses, e.g. Eroica x Virtus, and Virtus x Ergo, to obtain, if possible, (1) an Eroica type with better winter hardiness; (2) one combining the winter hardiness and early ripening of Virtus with stronger straw and higher grain yield and hectolitre weight; (3) a variety with the good straw and hectolitre weight of Ergo in combination with the winter hardiness and baking quality of Virtus. Progress has been made.

821. Bayles, B. B. 633.11:575(73)
New varieties of wheat.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 379–84.
An account is given of new wheat varieties released in the various regions of the United States in recent years.

822. Vogel, O. A.,
Swenson, S. P.,
Jacquot, H. D. and
Holton, C. S. 633.11:575(79.7)
Marfed wheat.
Bull. Wash. St. Agric. Exp. Sta. 1947 : No. 485 : Pp. 8.
Marfed is a new variety of soft white spring wheat which shows promise of being better adapted in districts of eastern Washington than the commonly grown Federation wheat. The new variety was selected from a cross between Marquis-Florence and Federation. Marfed is somewhat similar to Federation in head and kernel characters, but is distinguished by its white chaff, more inclined head and smoother kernel. In spring sown nursery trials at three locations during the period 1939–46, the average yield obtained from Marfed was 55·6 bushels per acre; the average yield of Federation was 49·3 bushels. In autumn sown nursery trials conducted at the same three locations during the period 1944–46, the average yield of Marfed was 62·6 bushels per acre, that of Federation 61·1 bushels. In tests of reaction to 25 races of common bunt, Marfed proved moderately to highly resistant to 13 races; Federation showed some degree of resistance to nine races. Marfed is slightly more winter-hardy than Federation. In milling quality Marfed is not always equal to Federation; in baking quality Marfed and Federation are approximately the same.

823. 633.11:575"793"(48.1)
Bjaanes, M. 633.11–2.183–1.521.6(48.1)
Foredling av høstkveite ved Møistad forsøksgård. (**Breeding of autumn wheat at Møistad Experimental Farm**).
Meld. Stat. Forsøksgård Møistad 1942 (1943) : H 80–95.
Meld. Stat. Forsøksstasjoner Plantekult. 1942 (1944).
Tillegg H til Landbruksdirektorens årsmelding 1942.
The work already recorded which resulted in the production of the autumn wheat Heid (cf. Abst. 163) has been continued in the endeavour to obtain an autumn wheat suitable for cultivation in more northerly regions of Norway. In 1932 ten different crosses were made, mostly between Russian, Finnish and Swedish varieties and lines of wheat, and during 1932–42, 40 autumn wheat crosses and two autumn x spring wheat crosses were made. So far, seven of these populations have undergone selection, and two crosses of interest are described here: Stavropolsk 193 (Heid) Labors élite 05 and 1933 Heid x 1635 from Moscow. So far the first of these crosses has produced six lines of interest, and the second,one interesting line, No. 0309. Of the six lines No. 0186 has undergone numerous trials, and, in view of its very stiff straw in combination with winter hardiness and productivity, it has been released as a new Norwegian variety under the name Sigyn. Whether a sister line 0136 will surpass Sigyn remains to be seen.
Though line 0309 has yielded 52 kg. more grain per dekar than Heid, and 25 kg. more than 0186, its straw is objectionable.
Details of a report on the baking quality of Heid and line 0186 are cited. The new variety seems to have inherited Heid's good flour quality.

824. 633.11:575"793"(48.1)
Linland, D. 633.1–2.4–1.521.6(48.1)
Forsøk med vårkveite, vårrug og havre 1934–41. (**Experiments with spring wheat, spring rye and oats 1934-41**).
Meld. Stat. Forsøksgard Forus 1940–41 (1942) : H 15–40.
Meld. Stat. Forsøksstasjoner Plantekult. 1941 (1943).
Tillegg H til Landbruksdirektorens årsmelding 1941.
In this detailed report on the comparative value of different varieties of wheat, rye and oats as crops for various parts of Norway, useful descriptions are included of the following

Norwegian wheats with notes on their origin as well as their performance in the trials reviewed: Børsum, Budde, 9/29–5/34, 41/25-10/33, Fram II, which is superior to the Diamant wheats in mildew resistance, Saerimner and Ås.
In discussing the relative merits of the various cereals, attempts to introduce into wheat by hybridization, resistance to take-all and whiteheads and to mildew are described. The author imported three types of spelt from Russia, *Triticum Spelta* var. *Ardnini*, *T. Spelta* var. *coeruleum*, and *T. Spelta* var. *album*, and crossed them with various wheat varieties. The hybrids with var. *coeruleum* and var. *Ardnini* have been rejected but some of those with var. *album* are still being tested and selected to obtain constant types of value. Some types have very large grain, others thick, stiff straw which is, however, too long. The 1000 corn weight of some types was 54–55 grm. as compared with 34 grm. for Diamant, but the shape of the grain is such that the hectolitre weight is somewhat low.
No. 9/29–5/34 appeared to be resistant to take all and whiteheads and to mildew from a test at Jaeren; though the soil was badly infected, No. 9/29–5/34 remained healthy for a long time and when it ultimately became infected, the symptoms were not nearly so severe as in Diamant. Vik found 9/29-5/34 to be mildew resistant but too late for Austland. To counteract the lateness it has been crossed with Saerimner and Budde which are early. Selection is proceeding with the hybrids which mostly seem however to have too long, weak straw; the straw of 9/29–5/34, is stiff and short; and the author hopes ultimately to evolve a type with short, stiff straw and as immune as possible to mildew and take-all and whiteheads.

No. 41/25–10/35 is a new selection of Budde, which is still segregating types with white ears and some with fully awned ears. Most of the plants have brown ears with short awn stumps like Budde, but with longer and denser ears. The grain is large. New selections have again been made. The heterozygous strain has given good yields of grain, but like Diamant, has too long a growing period, though some recent selections are better in this respect.
No. 72/25–10 was obtained from Børsum x Blue Stem. It has a brown ear and long awn stumps in the upper half of the ear. Recently it has begun to segregate for white ears, and for the fully awned condition and grain size and growing period. Selection is still proceeding ing to obtain constant types with brown ears, earliness, bigger grain and higher hectolitre weight. The heterozygous strain has large grain and fairly stiff straw, but only medium hectolitre weight.
Crosses have also been made between Petkus and Norland rye to obtain an earlier type with the high yield and quality of Petkus. This experiment and another with the same object, in which Petkus and the Petkus x Nordland hybrids were crossed with an early but otherwise rather inferior rye from among four varieties obtained from Russia, are still in progress.

825. Åkerman, Å. and
MacKey, J. 633.11:575"793"(48.5)
Höstvete. (**Autumn wheat**).
Sverig. Utsädesfören. Tidskr. **1946** : **56** : 226–31.

An historical account is given of wheat breeding in Sweden, where the breeder's problem has been to combine the yield of highly bred imported wheats with the cold resistance of Swedish land varieties. The methods used have been mass selection, then line selection, and finally, hybridization which resulted in more marked progress.
Practically all the Swedish wheats cited here have been already mentioned in *Plant Breeding Abstracts* or in the current lists of New and Promising Varieties issued by the Commonwealth Bureau of Plant Breeding and Genetics.
For southern Sweden, some crosses made at Svalöf between southern Swedish autumn wheats and high yielding, but frost susceptible varieties from western Europe, e.g. the Dutch variety, Wilhelmina, and the Danish, Trifolium 14, have been of interest.

826. Åkerman, Å. and
MacKey, J. 633.11:575"793"(48.5)
Vårvete. (**Spring wheat**).
Sverig. Utsädesfören. Tidskr. **1946** : **56** : 232–35.

The history of spring wheat breeding in Sweden is outlined.
A new variety 0972 c (from Extra Kolben II x Aurore), very like Fylgia which had the same

ancestry but superior to it in quality, has been produced at Svalöf. From the same cross, the very high yielding variety No. 0978 equalling Fylgia in earliness was obtained; it has surpassed Brons in yield by 3·7% in 34 trials, but its baking quality is no better than that of Fylgia, and extensive selection to improve that feature is now in progress. So far the varieties 0978 d_2 and 01085 from 01015 x Diamant II can be regarded as representing an improvement in baking quality.

A table is given showing the baking quality, i.e. percentage crude protein, dough weight and loaf volume, of some Swedish spring wheats, including a Halland land wheat, as recorded at Svalöf and at Tornby (Linköping) from about 1931 to 1943.

In the efforts being made to obtain early ripening varieties with at least as high a yield of grain as Fylgia and preferably with the dough yield and loaf volume of Extra Kolben, the most interesting types so far have been No. 01085 and some of its sister varieties.

827. Bakhuyzen, H. L. van de S. 633.11:575"793":577.17
Bloei en bloeihormonen in het bijzonder bij tarwe. I. (**Flowering and flowering hormones especially in wheat. I**).
Verslag. Landbouw. Onderzoek. 's-Gravenhage 1947 : No. 53 : 145–212.

The result of field and pot experiments on wheat, carried out during the period 1939–44, are reported and integrated into a scheme of development applicable to long and short day plants. This hypothesis is compared with those of Lysenko and Purvis and Gregory. Went's nomenclature is adopted for the specific hormones initiating and organizing the development of each organ, and these are assumed to be produced from a mother substance protocaline, the reaction being reversible. Finally the author considers the various factors that determine earliness from a genetical point of view, and concludes that (1) all the genes together determine the quantity of active vernalase which is present after a certain period of treatment at a certain low temperature; (2) the optimum and minimum temperatures, at which vernalase catalyses the reaction protocaline-vernaline, are controlled by a special gene; (3) photoperiodic reaction is controlled by more than one gene; (4) the optimum temperature for the reaction vernaline substance B (which is supposed to combine with substance A to form anthocaline and florigen) depends on a separate gene.

An explanation of the phenomena occurring during the photophase is promised in a future publication.

Application of a knowledge of the physiological genetical composition of a variety should assist in the production of extreme winter hardy or early wheats.

The discovery of growth phases of cultivated plants and the mode of reaction of a variety to the local climate occurring during these phases is of the greatest importance in breeding varieties ideally suited to that climate. C. B.

828. 633.11:575.125(45)
Forlani, R. 633.16:575.125
Le produzioni delle popolazioni discendenti da incroci fra razze diverse di frumento e di orzo. (**The yields of populations descended from crosses between different races of wheat and barley**).
Ital. Agric. 1943 : **80** : 143–49.

Crossed seed was produced in 1937 by crossing the wheats Mentana x Roma, in 1938 by crossing Mentana x Fanfulla, Mentana x Damiano Chiesa and Damiano x Littorio and in 1940 Mentana x Roma and the barleys 23 x Sirente. Comparative tests were made by sowing the seed in the autumn of 1941, 3000 grains being sown in each plot. Germination was usually a few days earlier in the crossed seed than in the earlier of the two parents and the yield of grain from the plants arising from crossed seed was in all cases superior, the difference varying from 6% in Mentana x Fanfulla and Damiano x Littorio to 30% in Mentana x Damiano among the wheats. A marked increase of both grain and straw yield was observed also in the barley cross.

829. McFadden, E. S. and
Sears, E. R. 633.11:575.127:576.356.5
The genome approach in radical wheat breeding.
J. Amer. Soc. Agron. 1947 : **39** : 1011–26.

A succinct review is given of papers dealing with the genomic constitution of the diploid,

tetraploid and hexaploid wheats, and the transfer of desirable characters to *Triticum vulgare* from other *Triticum* species and related genera. A useful bibliography of 53 references is appended.

Recent investigations by various workers have shown that the A genome of the tetraploid and hexaploid wheats is largely homologous with the genome carried by the einkorn or diploid wheats, and is probably derived from one of the einkorn species, *T. monococcum* L., *T. aegilopoides* (Link) Bal., or *T. Thaoudar* Reut. ex Boiss. The C genome of the hexaploid wheats is homologous with the genome found in the diploid species *Aegilops squarrosa* and is probably derived from that species. The specific diploid form which supplied the B genome of the tetraploid and hexaploid wheats has not yet been identified; the available evidence, however, supports the view that a species of *Agropyron* formed the source of genome B.

In view of the sterility and other problems encountered in using wide crosses in wheat, a breeding method based upon the allopolyploid nature and apparent trigeneric origin of *T. vulgare*, has been studied. The following four series of allohexaploids are suggested as basic material for the transfer of desirable characters from other species and genera to *T. vulgare*: (1) allohexaploids obtained by adding the C genome of *Aegilops squarrosa* to various tetraploid wheats; the resulting allohexaploid types should form more fully fertile hybrids with *T. vulgare* than the tetraploid wheats; (2) allohexaploids produced by crossing the tetraploid wheats with various diploid species of *Aegilops* other than *Ae. squarrosa*, and with *Haynaldia villosa*; (3) allohexaploids obtained by crossing amphidiploids of the combination AACC with various species of *Agropyron*; and (4) allohexaploids produced by crossing amphidiploids of the constitution BBCC, if obtainable, with varieties of the wild and cultivated species of einkorn.

The following allohexaploids are described: group (1), *T. dicoccoides* x *Ae. squarrosa* and *T. Timopheevi* x *Ae. squarrosa*; group (2), *T. dicoccoides* x *Ae. caudata*, *T. dicoccoides* x *Ae. comosa*, *T. dicoccoides* x *Ae. sharonensis*, *T. dicoccoides* x *Ae. speltoides*, *T. dicoccoides* x *Ae. umbellulata*, *T. dicoccoides* x *Ae. uniaristata*, *T. dicoccoides* x *H. villosa*, *T. dicoccum* x *Ae. sharonensis*, *T. persicum* x *Ae. sharonensis*, *T. Timopheevi* x *Ae. bicornis*, *T. Timopheevi* x *Ae. caudata*, *T. Timopheevi* x *Ae. speltoides*, *T. Timopheevi* x *Ae. uniaristata* and *T. Timopheevi* x *Ae. umbellulata*. In work on group (3), the basic genome, AACC, has been obtained in the amphidiploid *T. aegilopoides* var. *baidaricum* Flaksb. x *Ae. squarrosa*. The basic combination, BBCC, desired for breeding allohexaploids of group (4) has not been obtained.

830. Wellensiek, S. J. and Reinders, D. E. 633.11:575.127.5:633.14:581.04:581.162.5(49.2)
Over tarwe x rogge-kruisingen. (**Wheat-rye hybrids**).
Meded. N.A.K. 1944 : **1** : No. 1 : Pp. 14.

After an historical introduction, the authors discussed the cytology of these hybrids and their lack of fertility, and described methods of crossing, vegetative multiplication (by which they obtained over 3000 plants from 20 seeds), and of treatment with colchicine. For the latter the tip of the coleoptile of a newly germinated seed is cut off and the first leaf is removed. The coleoptile then resembles a cylinder into which a colchicine solution is run from a hypodermic needle as it is withdrawn. They had no success with soaking seeds in 0·025% colchicine for 24 hours, nor with the absorption of a weak colchicine solution by the roots as recommended by Navashin and Gerassimova. There was undoubted success, however, by the coleoptile method with an F_1 plant of Juliana x Petkus, using 0·1% colchicine, as the plant produced 108 grains. Cytological examination of the F_2 showed 56 chromosomes in several root tips. The F_1 plant produced 55 ears of which 48 were sterile, 3 bore 1, 6 and 6 grains, and 4 bore 29, 28, 20, and 18 grains respectively.

Ears of the F_1 plants were severely attacked by ergot, but only the sterile ears.

The authors proceed to discuss a plan for future production of *Triticale*, and suggest that attempts should be made to introduce the fertility factor from Chinese wheat by first crossing it with more valuable varieties. They report 63% success from a cross of Chinese and Petkus winter rye. Perhaps the work that would be required for this should be employed in producing hybrids from existing wheat varieties on an enormous scale.

The authors summarize their conclusions as follows:—

(1) The purpose of crossing wheat and rye is to combine the good qualities of the parents, especially to get a wheat-like product that will yield at least as well as rye on poor land.

(2) In all probability, as a result of colchicine treatment, a fertile hybrid of Juliana wheat and Petkus rye, thus a *Triticale*, was obtained.

(3) In drawing up a plan of work for producing valuable *Triticale* forms, in which the result mentioned in (2) takes its place, attention is drawn to the following points brought forward by other research workers:—

(*a*) The good compatibility with rye of a Chinese variety of wheat, which hereditary character can be bred into other wheat varieties.

(*b*) The desirability of using as pollen parents, races of rye that are tolerant of inbreeding.

(*c*) The importance of root treatment with colchicine, combined with vegetative multiplication, which appeared to be quite a practical possibility.

(*d*) The crossing of *Triticale* forms *inter se*, followed by selection. C.B.

831. HAUSSMANN, G. 633.11:575.127.5:633.289
Che cos'è il frumento perenne? (**What is perennial wheat**).
Ital. Agric. 1943 : **80** : 295–307.

A description is given of the Russian work on *Triticum* x *Agropyron* hybrids, largely following the lines of that reviewed in *Plant Breeding Abstracts*, Vol. XVII, p. 105.

832. MINISCALCO, V. 633.11:575.127.5:633.289(47)
Conquiste della genetica vegetale. (**Conquests in plant genetics**).
Ital. Agric. 1946 : **83** : 385–87.

A brief summary is given of the results with *Triticum* x *Agropyron* hybrids published by Cicin [Zizin] in 1937 (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 1156). It is thought that some of them might be of interest for the less favourable situations in Italy, such as salt marshes, high mountain zones or sandy areas.

833. SMITH, L. 633.11:576.354.4:575.127.2
Irregularities in a hybrid between *Triticum durum* and *T. persicum*.
J. Agric. Res. 1947 : **75** : 301–05.

The F_1 hybrid plants from the cross *T. durum* var. Kubanka and *T. persicum*, both tetraploid wheats, showed a number of meiotic abnormalities. The chief abnormality was the occurrence of a quadrivalent in each pollen mother cell. Bivalents were also more frequent in the hybrid than in the parents. Micronuclei occurred with approximately equal frequency in *T. persicum* and the F_1 hybrid; in both they were about four times as frequent as in *T. durum*. In addition to these abnormalities other less definite abnormalities were observed, such as somewhat disorderly metaphase plates. The F_1 hybrid plants showed no heterotic effect, and were three times more seed sterile than *T. persicum* and over ten times more seed sterile than *T. durum*; observations on pollen sterility showed a similar relationship. It is suggested that such irregularities in hybrids between wheat species of the same chromosome number are more common than is generally recognized.

834. SMITH, L. 633.11:576.356.2:537.531:575.116.1
A fragmented chromosome in *Triticum monococcum* and its use in studies of inheritance.
Genetics 1947 : **32** : 341–49.

This paper is an expanded version of a previously published abstract (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1151).

835. SIEF, D. 633.11:581.02(56.9)
(**Remarks on the phenology of some wheat varieties in Palestine**).
Hassadeh 1947 : **27** : 528–30, 575–79.

This article contains observations made by a member of a communal settlement on the behaviour of wheat varieties sown at different dates and thus grown under widely different conditions of temperature and length of day. C. O.

836. VARENICA, E. T. 633.11:581.162.4:575.12(47)
(Breeding winter wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 26–36.

The area of the Kiev province where the Mironovka breeding station is situated is characterized by severe winters with temperatures of —20 to —25° C., with very little snow cover. Most imported wheat varieties proved incapable of standing up to these conditions, an exception being provided by the Banatka wheats from Hungary, selection from which gave rise to the famous wheat Ukrainka. This variety has served as the main parent in later crossing work, and between 1924 and 1938 it was a constituent in 709 different hybrid combinations. The results of the hybridization work have however been disappointing; the early hybrid generations exceeded the standard varieties in yield but the later generations have shown a gradual diminution in yield. One of the main reasons for this is thought to be the use of a limited quantity of pollen for pollination, thus ruling out the possibilities of selective fertilization; also the use of pollen from late tillers when the flowering times of the two varieties to be crossed did not coincide; this is thought to have a detrimental effect on the quality of the offspring. The institute has now gone over to the method of intervarietal crossing by open wind pollination. The hybrids produced in this way, resulting from selective fertilization, have proved hardier and more disease resistant, have grain of better quality and are more vigorous and productive. For this reason this method has been adopted almost exclusively in the breeding work from 1939 onwards. The work was interrupted during the war years but was resumed in 1945, in which year a number of comparisons were made between the results of artificial pollination, free pollination among groups of plants within an isolator, and open pollination by the wind. The yields of grain in 1946 showed that the wind open pollinated plants yielded 26% to 41·3% more than the parents. The average increase from group interpollination was less but the differences varied from 6% to 80%. The yields from the plants from artificial pollination varied from 63% to 172% of those of the parents. In crosses with the winter hardy variety Šmitovka artificial pollination gave the best results. In the majority of cases the winter survival was proportionate to the yield and was therefore much higher in the products of selective fertilization. The yields of the F_2 generation of representative families also show the superiority of the products of selective fertilization, the average yield of which was 14·5% above that of the plants from artificial pollination and 18% above that of Ukrainka. From a practical standpoint the most promising varieties obtained from open pollination are Erythrospermum 444 and Hostianum MB–1. The former yielded 2·08 c. per ha. more than Ukrainka in 1946 and proved somewhat more hardy and resistant to brown rust. The second variety was equal to Ukrainka in yield but exceeded it in resistance to brown rust and bunt, and was three days earlier in maturity. In resistance to brown rust and bunt, it exceeded even such well known varieties as Lutescens 17 and Erythrospermum 15. Hostianum MB–1 was produced by selection from populations arising from open pollination of Ukrainka in 1939; the first generation consisted of a mixture of types belonging mainly to the varieties *erythrospermum* and *hostianum*; the proportion of *erythrospermum* types was greater in the second generation and in the third generation mass selection was carried out and the best selection of each botanical type bulked to produce an F_4; the *hostianum* population gave rise to the variety known as Hostianum MB–1.

The method of free interpollination is being used extensively now at the station and if a combination between two particular varieties is required they are sown together in spatial isolation, the ears of one of them being emasculated. In 1946, 4600 ears of Ukrainka alone were pollinated in this way, and 51,000 hybrid grains were sown. The F_1 plants survived the rigours of the winter and yielded 30–40% more than Ukrainka. Another method employed was to place 6–10 emasculated ears of the seed parent in a large bag and on the following day introduce an equal number of ears of the pollen parent. The progenies from both these methods gave better yields than those from artificial hybridization, sometimes several times as much. In open pollinated progenies from a variety of stable hereditary nature such as Ukrainka, only about 6·5–13·7% of the plants deviated from the maternal type, whereas the progenies from a hybrid variety deviated by over 50%. The deviations were greater in meteorologically abnormal years than in years with normal conditions.

The progeny of intervarietal crosses made by selective fertilization, even with a small number of ears within an isolator, was quite different from the progeny from the same varieties hybridized artificially. In the progenies from selective fertilization, so-called recessive characters such as awning often predominated over the so-called dominant characters; various intermediate forms also often appeared. Thus out of 123 F_1 plants, of the cross Alabasskaja (awnless) x Ukrainka, 83, i.e. 67·2% were awnless; they resembled the maternal parent but were more vigorous; one plant was fully awned, 2 were semi-awned and 37 had short rudimentary awns.

In another cross made by free pollination within bags with Ukrainka as the female parent and Lutescens 17 as pollen parent, 13·9% of the F_1 plants were awned like Ukrainka, while the reciprocal cross contained 5·3% awned forms, showing, the author affirms, that the maternal hereditary constitution is manifested more strongly in the progeny.

A study of the morphological features of the offspring showed that although a number of the F_2 families showed wide segregation, many of them were uniform and preserved the maternal type, as in the F_1, almost unchanged. Non-segregating F_2 families were more frequent in the open wind pollinated crosses.

The author emphasizes that, in order to produce hybrids possessing the characters desired it is necessary to raise the hybrids under conditions conducive to the development of these characters.

This year over 100 kg. of seed of Ukrainka subjected to open wind pollination has been produced, and since 90% of it conforms to the maternal type, selection will be practised on this part of the population and in 2–3 years it is hoped that a material improvement of Ukrainka will have been effected. The other section of the population will be subjected to selection as hybrid material.

837. Budkov, A. F. 633.11:581.48:631.557
(The influence of size of seed on yield).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 72–73.

Grains of the spring wheat Lutescens 62 and the winter wheat Sandomirka were sorted into four sizes, which were sown separately. The yields from the four fractions were respectively 78, 88, 104 and 113 per cent of the control. It is recommended that fraction IV, with the largest grains, should be used for raising seed, fraction III for sowing on the farm, and fractions I and II for consumption.

838. Gerngross, O. and 633.11:581.6
Berkmen, N. 633.11:581.05
Ankara iklim ve toprak şartlari tesiri altında bazı ecnebî buğday tipleri tanelerinin dahilî ve haricî evsafında vâki olan değişiklikler hakkında. **(Alterations in the external and internal characteristics of the grain of some foreign wheat types under the influence of the climate and soils of Ankara).**
T.C. Yüksek Ziraat Enstitüsü, Çalişmalarindan, Ankara 1939 : No. 105 : Pp. 43.

A study is presented of the influence of the climate and the soil of Ankara on the character of the grain of 22 species of wheat from several different countries. The results show, among other things, that the low ash content of Turkish wheats is due to the character of the soil of Central Turkey, not to the type of wheat, and that the quality of the gluten of wheat is not a constant hereditary character, at least in the case of some forms.

839. Améen, G. 633.11:581.6(48.5)
Bakningsdugligheten och diastatiska tillståndet hos vetemjöl. **(Baking quality and diastatic state in wheaten flour).**
Agri Hortique Genetica, Landskrona 1946 : **4** : 68–73.
Hörberg, Y.
Bakningsdugligheten och diastatiska tillståndet hos vetemjöl. **(Baking quality and diastatic state in wheaten flour).**
Ibid. 1946 : **4** : 74–78.

The first paper criticizes, from the miller's standpoint, Hörberg's conclusions on the

dependence of baking quality on viscosity and diastatic power (cf. Abst. 840) and on the need for an investigation of the basis on which the evaluation of wheat grain is conducted. In the second paper Hörberg rejects the criticism, dealing with Améen's argument point by point.

840. Hörberg, Y. 633.11:581.6(48.5)
Bakningsduglighetens beroende av viskositet och diastatiskt tillstånd hos vetemjöl. (**The dependence of baking quality on viscosity and diastatic state in wheaten flour**).
Agri Hortique Genetica, Landskrona 1945 : **3** : 61–93.

In the report of this investigation carried out with both spring and autumn wheats, attention is given to the problem of the experimental technique and the general question of the proper basis for judging the quality of Swedish wheats.

The results revealed, in the presence of normal to high crude protein content, (1) a correlation between viscosity and diastatic power; (2) a marked correlation between falling viscosity and improved baking quality; and (3) a correlation between rising diastatic power and increased loaf volume.

The winter and spring wheats differed in the degree of correlation between baking value and viscosity and diastatic power respectively.

841. Cook, L. J. 633.11:581.6(94.2)
Baking quality of wheat varieties.
J. Dep. Agric. S. Aust. 1947 : **51** : 174–77.

The results of baking quality tests carried out in the 1944–45 and 1945–46 seasons on wheat varieties grown in South Australia are discussed. A table is given summarizing the results of previous tests, which were begun in 1938. The following varieties have been studied in the period 1938–46: Scimitar, Dirk (Ford x Dundee), Warigo, Ridley, Javelin, Dundee, Ford, Nabawa, Rapier, Seewari, Bencubbin, Sword, Ranee 4H and Gluyas. The combined results show that (1) bushel weight is not correlated with protein content or baking strength; (2) both the bushel weight and protein content of the flour depend upon the season, locality and variety; (3) the figures for baking strength correspond with the protein content values in so far as the districts are concerned, and more or less correspond as regards the seasonal effect, but do not correspond if the varietal factor is considered; (4) some varieties high in protein content are high in baking strength while others are low in baking strength; and (5) the flour strength varies considerably, the more recently bred varieties such as Scimitar, Dirk and Warigo, giving stronger flours than the older varieties such as Ranee and Gluyas.

842. Berg, S. O. 633.11:581.6:575(48.5)
Är vetemjölets örighetsgrad huvudsakligen en sortegenskap? (**Is the degree of grittiness of wheat flour mainly a varietal character**?)
Agri Hortique Genetica, Landskrona 1946 : **4** : 1–14.

The writer has been observing the relation between grittiness and crude protein content for over 10 years and has failed to find the positive correlation generally assumed to exist. Moreover, he has succeeded in producing varieties uniting a high degree of grittiness with a relatively low crude protein content, e.g. Eroica (1943).

Sifting tests with crops from several yield trials of winter wheats (which included Virtus and Eroica and several Eroica x Virtus strains) and of spring wheats have, in the writer's opinion, produced evidence that the variety, and not the high or low crude protein content is decisive in determining the degree of grittiness.

The possibility that grittiness might be correlated with vitreousness or other factors such as the chemical composition of the proteins or the size of the protein molecules is mentioned. Experiments not reported here suggest that grittiness and the gluten swelling index are not correlated.

843. Kizima, P. N. 633.11:581.6:577.15
(**The diastatic activity of the flour of different varieties of wheat**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 59–63.

The main starch hydrolysing enzyme in sound grain is β-amylase but in damaged grain α-amylase also plays an important part, with the result that a dry loaf is produced, since

the α-amylase fermentation stops short at the stage of dextrins. The diastatic activity of the grain also varies from variety to variety, most of the *Triticum vulgare* varieties with the highest baking quality having a diastatic activity of 250–350 mg. Varieties of *T. durum* also have high values.
The values tabulated show that the diastatic activity is very much influenced by conditions of growth, but within each set of conditions the varietal differences are maintained.

844. Lamb, C. A. 633.11:581.6:578.08
Protein as a factor in soft wheat meal mixogram area.
Cereal Chem. 1947 : **24** : 376–80.
The sifted meal mixogram is suggested as a valuable method of testing the quality of a large number of lines in the early stages of soft wheat breeding investigation. The mixogram area is influenced by both the protein content and varietal factor. A method of measurement is described by means of which the influence of the protein is reduced to negligible proportions on sifted wheat meal mixograms, so that differences between varieties or lines independent of the protein level may be determined.

845. Buré, J. and
Begué, D. 633.11:581.6:578.088
L'appréciation du taux d'extraction des farines par l'examen Pékar au pyrocatéchol. (**The estimation of the rate of extraction of flours by the Pékar test with pyrocatechol**).
C. R. Acad. Agric. Fr. 1947 : **33** : 473–78.
Data concerning the different reactions of the grains of 12 wheat varieties to treatment with various chemical reagents in connexion with the rate of extraction of their flour are included.

846. Clark, J. A. and
Quisenberry, K. S. 633.11–1.47(73)
Distribution of the varieties and classes of wheat in the United States in 1944.
Circ. U.S. Dep. Agric. 1948 : No. 761 : Pp. 80.
Wheat varietal surveys have been made by the United States Department of Agriculture since 1919 at five-yearly intervals. The present circular reports the results of the sixth survey, carried out in 1944. The methods used in making the survey are outlined. Tables provide information on the estimated acreage of varieties and classes of wheat in the whole of the United States and in each different state; and the text includes sections on the distribution in 1944 and previous years of each of the varieties in the different wheat classes.

847. 633.11–1.524(73)
633.14–1.524(73)
Foreign wheat introductions, V.
U.S. Dep. Agric.; Agric. Res. Admin.; Bur. Pl. Indust., Soils, Agric. Engin.; Div. Cereal Crops Dis. 1947 : Pp. 9.
A list is given of the varieties and selections of *Triticum dicoccum, T. durum, T. vulgare* and rye introduced into the United States during the period 1941–47. Seed of these wheats and rye varieties and selections is available at the Division of Cereal Crops and Diseases, Plant Industry Station, Beltsville, Maryland. The list includes information on resistance to stripe rust, loose smut, scab and leaf rust and on shortness of straw and dormant seeds.

848. Boyce, S. W.,
Copp, L. G. L. and
Frankel, O. H. 633.11–1.557:575.42
The effects of selection for yield in wheat.
Heredity 1947 : **1** : 223–33.
The efficiency of selection of single plants and their progenies in breeding for increased yield in wheat is examined. The value of different methods of selection is compared. Selection for yield components instead of yield itself did not increase efficiency. Selection for straw length did not seriously affect the efficiency of selection for yield. The value of eye

selection of plants and of plots as compared with selection by weight is assessed. Higher mean yields were obtained from progenies selected in both the F_2 and F_3 generations than from those selected in the F_2 but rejected in the F_3.

849. BALDACCI, E. and CIFERRI, R. 633.11–2.111–1.521.6:581.6(45)
Prime prove di resistenza al freddo di frumenti italiani. (Preliminary experiments on some Italian wheats in regard to their resistance to cold).
Ann. Sper. Agrar. Roma 1947 : **1** : 5–16.

Using the technique adopted by Worzella (*J. Agric. Res.* 1935 : 50 : 625–35), a number of varieties of *Triticum vulgare* and *T. durum* were subjected to temperatures of (*a*) + 2° C. for 48 hours followed by −12° C. for 24 hours, (*b*) +2° for 24 hours and −5° for 24 hours and (*c*) +2° for 24 hours and −9° for 24 hours.
All varieties were damaged by exposure to temperatures from −5° to −12° C. and the best differentiation was effected by treatment at − 4° C. after hardening at + 2° C.

850. BALDACCI, E. and CIFERRI, R. 633.11–2.112–1.521.6(45)
Ricerche sperimentali sulla stretta del frumento. (Experimental studies on premature ripening in cereals).
Ital. Agric. 1944 : **81** : 104–11.

This is a somewhat abridged account of the work referred to in *Plant Breeding Abstracts*, Vol. XVII, Abst. 1160.

851. CALDWELL, R. M. and COMPTON, L. E. 633.11–2.45–1.521.6:575(77.2)
Vigo: A new disease resistant wheat.
Bull. Ind. Agric. Exp. Sta. 1947 : No. 521 : Pp. 11.

The new soft red winter wheat, Vigo, was released in 1946. It was developed co-operatively by the Purdue University Agricultural Experiment Station, Indiana, and the United States Department of Agriculture, from a cross between the loose smut resistant Trumbull variety and a leaf rust resistant selection of Fultz (C.I. 11512).
Vigo is a beardless, white-chaffed strong strawed wheat. It has shown superior yielding ability in several states, and in milling and baking quality the grain has equalled or excelled that of the standard commercial soft wheat varieties. The new variety has also shown a winter hardiness superior to that of most soft red winter wheats with good quality grain. Vigo is resistant to the common races of leaf rust and loose smut, and to mosaic. Breeding work is, however, in progress to incorporate resistance to certain races of leaf rust and loose smut which may attack the new variety.

852. HOLTON, C. S. 633.11–2.451.3:576.16:575.12:631.521.6(73)
Host selectivity as a factor in the establishment of physiologic races of *Tilletia caries* and *T. foetida* produced by hybridization.
Phytopathology 1947 : **37** : 817–21.

Varietal selectivity of the wheat host has been found to be an important factor in the establishment of physiological races of bunt produced by hybridization, the nature of this selective influence depending largely upon the degree of resistance of a given wheat variety. It was found that the highly susceptible hybrid 128 tended to promote the establishment of races with low virulence, while highly resistant wheat varieties tended to promote the establishment of highly virulent races.

853. RYŽEĬ, I. P. 633.11–2.451.3–1.521.6:581.142
(Increasing the resistance of winter wheat varieties to bunt).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 40–44.

Observations over a number of years revealed a positive correlation between germination energy and resistance to bunt. A selection experiment was therefore started in which seeds were germinated under normal conditions and those which germinated within 2–3 days were selected. From these only those in which the young shoot emerged from the

embryo at a right angle and had three well developed roots were retained. The grain produced by the selected plants was subjected to the same selection process; part of it was previously infected with bunt spores. Two bunt resistant families have been selected in this way from the variety Ukrainka 246, their degree of infection being 16·2 and 17·6% as compared with 56·8% in the original variety. They are superior to the initial variety also in other features such as yield, baking quality and resistance to lodging and shedding.

854. Dionigi, A. 633.11–2.451.3–1.521.6:581.143.26.03
"Letargo attivo" e "letargo passivo" in patologia vegetale. (**Active and passive lethargy in plant pathology**).
Riv. Patol. Veg. Pavia 1941 : **31** : Nos 9–10 : Pp. 7.

Plants of a susceptible wheat variety, Mentana, when infected with *Tilletia* spores and kept in a greenhouse at 20–25° C. throughout the winter, were not attacked, whereas control plants similarly infected and grown in the open, showed a 30% attack. A certain period of low temperature is evidently necessary to induce the chlamydospores to germinate. The phenomenon is referred to as "active lethargy" and is a factor which must be borne in mind in making resistance tests.

855. Sibilia, C. 633.11–2.452:576.16(67.6)
Nuovi studi sulla specializzazione fisiologica di *Puccinia graminis tritici* Erikss. et Henn. in Africa Orientale Italiana. (**Further studies on the physiological specialization of *P.g. tritici* Erikss. et Henn. in Italian East Africa**).
Agric. Colon. 1940 : **34** : No. 4 : Pp. 5.

Three new physiological races have been identified; none of them infects Reliance and Vernal but all attack Mindum, Acme and einkorn.

856. Vallega, J. and
Favret, E. A. 633.11–2.452:576.16:631.521.6(82)
Razas fisiológicas de "Puccinia graminis tritici" que atacan a "*Triticum Timopheevi.*" (**Physiological races of *P.g. tritici* which attack *T. Timopheevi***).
Rev. Invest. Agric. B. Aires 1947 : **1** : 113–18.

Under field conditions in Argentina, *T. Timopheevi* is susceptible to attack by races 15 and 17 of *P. graminis* var. *Tritici*; in the greenhouse, it is also susceptible to races 11 and 42. The strain of race 15 prevalent in Argentina appears to be race 15 B. The Argentine races 11 and 17 are not identical with the North American races bearing the same numbers.

857. Volosky Yadlin, D. 633.11–2.452:576.16:631.521.6(83)
Nuevas razas fisiologicas de *Puccinia triticina*, para Chile. (**New physiological races of *P. triticina* in Chile**).
Agric. Tec. Chile 1946 : **6** : p. 67.

Races 55 and 66 of *P. triticina* have been discovered in Chile.

858. Soutter, R. E. 633.11–2.452–1.521.6:575(94.3)
Progress in wheat breeding, 1946–47.
Qd Agric. J. 1947 : **65** : 101–14.

A report is given of tests on 14 introduced wheat varieties and 14 wheats and hybrid selections developed in Queensland, carried out in observation plots at the Queensland Agricultural High School and College, Lawes, during the 1946–47 season.
Notes are given on the varieties and hybrid selections tested. The following introduced wheats were included in the tests: Charter, Gabo, Kendee, Pusa 4, Warigo, Gular, Celebration, Yalta, Eureka, Hofed, Insignia, Gluyas, Currawa and Ford. Varieties and hybrid selections bred in Queensland included Seafoam, Puglu and Flora; selections K54P4–4608 and 4652 from the cross Kenya 10854 x Pusa 4; selections KGPF–4613, 4521, 4676, 4655, 4672 and 4508 from a cross between Kenya Governor and Pusa x Flora; the selection wheat x rye 4601, resulting from a cross between Kenya Governor wheat and an unknown rye; selection 4607 of Post Harvest; and selection SFPFHS 4607 derived from a multiple cross involving Seafoam, Pusa 4, Flora and Hope. The more recent of the hybrids developed in Queensland were bred for rust resistance.

It was observed that all the samples of plump grain obtained were produced by stem rust resistant material, but that the latter did not invariably yield plump grain. Leaf rust appears to have little effect upon yield and kernel quality in Queensland. The results suggest that the relatively greater drought resistance of locally bred wheats plays an important part in yielding capacity and kernel quality.
A number of new hybrids, particularly those selected from the cross Kenya 10854 x Pusa 4 and the cross between Kenya Governor and Pusa x Flora, show promise, and will be entered in the replicated plot tests of the 1947–48 season. They combine stem rust resistance, good yielding capacity, high bushel weight and satisfactory grain characteristics.

859. EL-HELALY, A. F. 633.11–2.484–1.521.6(62)
The black-point disease of wheat.
Phytopathology 1947 : **37** : 773–80.

Black-point disease of wheat occurring in Egypt was found to be due to species of *Alternaria*. Varietal tests of susceptibility to the disease were carried out. Hindi D was found to be the least susceptible variety, followed by Giza 7, Giza 102, and Giza 121 (Mabrouk). The size of the grain has a direct effect upon the incidence of the disease. Large grains force the glumes open, giving access to the fungus spores, whereas the glumes of small grains remain closed, infection thus being avoided even under environmental conditions favouring infection. The resistance of certain varieties is mainly due to their production of small kernels.

860. 633.11–2.7–1.521.6:575(71.24)
Grasshopper resistant wheat under investigation at Swift Current.
Canad. Grain J. 1947 : **3** : No. 3 : p. 11.

It is mentioned that at the Swift Current Federal Experiment Station, Saskatchewan, wheat breeding for grasshopper resistance is receiving attention.

861. SALOHEIMO, L. 633.11.00.14(47.1)
Resultaten av sortförsök med vårvete på Finska Mosskulturföreningens Karelska försöksstation åren 1936–45. (**Results of variety trials with spring wheat at the Karelian Experimental Station of the Finnish Association for Bogland Cultivation 1936–45**).
Finska MosskFören, Årsb. 1946 : **50** : 19–21.

This is a report on the performance of several Finnish and some Swedish wheats on different types of soil in Karelia. In addition to varietal differences in yield, variation in protein content on different soils was recorded. The Finnish varieties Sopu, Hopea, Tammi and Kimmo did well, the last two surpassing the Swedish variety Diamant on fen soil in both yield and earliness. Tammi has also very stiff straw.

862. 633.11.00.14(48.1)
GLAERUM, O. 633.11:575"793"(48.1)
Forsøk med vårhvetesorter. (**Trials with spring wheat varieties**).
Meld. Stat. Forsøksgård Møistad 1941 (1942) : H3–17.
Meld. Stat. Forsøksstasjoner Plantekult. 1941 (1943) Tillegg H til Landbruksdirektorens årsmelding 1941.

The Norwegian spring wheat varieties whose performance, in trials with Finnish and Swedish wheats, in the Oplandene counties of Norway from 1925–1941 is recorded include: Frøya, Ås, Fram II, Saerimner.
Yield, earliness, resistance to lodging, and baking quality were studied.
Frøya and Ås were equal in grain yields during 17 years' trials; their yields are uniform and so early that ripening in cool seasons is not hindered; their hectolitre weight, grain size and baking quality are satisfactory, and, though lodging does occur, it is usually not bad enough on the soil of the Oplandene to prevent machine harvesting; Frøya, without any admixture of foreign wheat, gives very good flour for baking bread, etc.
Fram II deserves special attention in the Oplandene, where on the average it surpasses Frøya and Ås in grain yield by 20–30 kg. per dekar, while ripening practically at the same time. It has stiffer straw than Frøya and it is resistant to mildew and loose smut.
The above three improved Norwegian varieties are recommended for the Oplandene.

863. 633.11.00.14(48.9)
RASMUSSEN, L. 633.491.00.14(48.9)
Beretning om Sorts- og Stammeforsøg. (**Report on variety and strain trials**).
Beretn. Planteavl. Lolland-Falster 1940 (1941) : 104–09.

These trials were conducted by the Danish Provincial Variety and Strain Committees of the Plant Cultivation Committee, set up in 1934 to introduce more uniformity in the testing of varieties and strains in local trials.

Wheat

In autumn 1939 23 trials were laid down with Pajbjerg Kongehvede II [Pajbjerg King wheat II], Øtofte 103, and Jubilé [Jubilee]. The severe winter of 1939–40 spoiled the trials in many districts and a survey of survival among 17 stands and of yields from 9 stands was carried out.

The Øtofte 103, bred by H. N. Frandsen of Øtoftegaard, proved very winter hardy, while Jubilé showed poor resistance to cold. The grain yields recorded were: Pajbjerg Kongehvede II, 22·7, Øtofte 103, 29·9, and Jubilé, 17·8 hkg. per ha., but owing to the abnormal conditions prevailing, these figures and those for the yields of straw cannot be regarded as exact.

Potatoes

The trials described in 1939 with King Edward and Bintje were continued in 23 tests in three different localities. In addition to yields, cooking qualities (including blackening and flavour estimations) were also recorded, and the methods used are described. Both varieties were classed as good table potatoes.

864. 633.11.00.14(48.9)
633.491.00.14(48.9)
RASSMUSSEN, L. 633.491:581.6:578.08(48.9)
Beretning om Sorts- og Stammeforsøg. (**Report on variety and strain trials**).
Beretn. Planteavl. Sjaelland 1940 (1941) : 183–88.

This report has already been reviewed under Abst. 863.

865. 633.11.00.14(48.9)
RASMUSSEN, L. 633.42.00.14(48.9)
Beretning om Sorts- og Stammeforsøg. (**Report on trials of varieties and strains**).
Beretn. Planteavl. Sjaelland 1941 (1942) : 188–99; also Beretn. Planteavl. Lolland-Falster 1941 : 160–71.

This report deals with Danish and other wheats, sugar mangels, and sugar beets for fodder and one trial of sugar beets, sugar mangels, beet roots and swedes.

866. LI, H. W. and 633.11*Aegilops*:575.12:576.312.35
TU, D. S. 576.356:575.255
Studies on the chromosomal aberrations of the amphidiploid, *Triticum timopheevi* and *Aegilops bicornis*.
Bot. Bull. Acad. Sinica 1947 : **1** : 173–86.

An investigation is presented of the cytology of the progeny of two amphidiploid hybrids between *T. Timopheevi* and *Ae. bicornis*. Of the 33 plants obtained, 20 had 42 chromosomes, 8 had 41, 2 had 40 and the other 3 had 39, 43 and 44 respectively. The occurrence of varying numbers of univalents in all the plants studied is attributed to the inability of some pairs of the *Aegilops* chromosomes from the male parent to compete with the *Triticum* chromosomes which are in their own cytoplasm for nucleic acid for their reduplication in time for crossing-over to occur.

Varying numbers of hypo-cells and hyper-cells were found in practically all the plants. The causes of the anomalies of mitosis through which they originated are discussed.

Non-synchronized division of the different chromosome sets and residual affinity of chromosomes of like origin occurred with varying frequency in different plants.

One or possibly two plants were chimaeras.

Of the 33 plants, 22 were variegated. This was not explained.
The pollen sterility of the plants varied and was not correlated with chromosome constitution. Seed set also varied, $2n$ plants being more fertile than $2n - x$ types.

BUCKWHEAT 633.12

867. HAUSSMANN, G. 633.12(45)
Per un miglioramento della coltura del grano saraceno. (**Towards an improvement in the cultivation of buckwheat**).
Ital. Agric. 1944 : **81** : 45–64; also Annu. R. Ist. Sper. Chim. Agrar. Torino 1941–1945 : **15** : 257–81.

Basing himself mainly on data published in Russia, the author gives an account of the cultivation of buckwheat, the botanical classification of the species and varieties, the climatic and other conditions tolerated by the plant, the methods of cultivation, and the breeding work carried out in the U.S.S.R. In Italy, the variety Nera delle Alpi [Alpine Black] has given yields of 9·5 quintals per ha. when sown after wheat at the end of July, and experiments are to be continued with other varieties, local and imported.

868. 633.12:575(47)
BAŽENOV, N. V. 633.12–2.111–1.521.6(47)
(**Breeding buckwheat at the Krasnyĭ Ufim State Breeding Station**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 28–29.

Over 200 varieties from other regions and from abroad have been tested, but the ancient local race proved better than any and was chosen as a basis of selection. From it several improved varieties superior in yielding ability have been produced and are enumerated. Selection for frost resistance is now being practised and forms capable of withstanding −5° C. have already been produced.

OATS 633.13

869. 633.13:575(48.1)
BJAANES, M. 633.13.00.14(48.1)
Forsøk med havresorter. (**Trials with oat varieties**).
Meld. Stat. Forsøksgård Møistad 1941 (1942) H49–69.
Meld. Stat. Forsøksstasjoner Plantekult. 1941 (1943). Tillegg H til Landbruksdirektorens årsmelding 1941.

The period covered by these trials at different centres in Norway is 1935–41. The varieties tested were Gullregn II [Golden Rain II], Ørn [Eagle], Primus, Kytø (from Jokioinen, Finland), Stjerne [Star], Hvit Odal [White Odal], and Perle [Pearl], and also Odin up to 1939, and a new variety Hein from 1938–41 in trials with Gullregn II.
Yields, earliness, hectolitre and 1000 corn weights, husk percentage, and usefulness for Norwegian agriculture were studied, and the performance and characteristics of the different varieties are described. In addition to the variety Hein, obtained from the Felleskjøpets Stamsaedgård at Vidarshov, and derived from a cross between Odin and Perle, other new forms from the testing plot in which new varieties and lines undergo initial selection are mentioned, including Merkur, bred at the Forus Station.

870. ÅKERMAN, Å. and
MACKEY, J. 633.13:575(48.5)
Havre. (**Oats.**)
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 236–41.

For oat breeding in Sweden different types of oat grown in the country have been used: the white Probsteier; the early white; the black type of central Sweden; and the black of the northern Scandinavian type.
The methods, aims and progress in breeding operations with the above four types are outlined, and graphs are given showing the great increase in yield and straw strength attained in white oats during 1890–1945, in black oats of the central Swedish type at the Ultuna station during 1900–45, and in early black oats at the Västernorrland and Övre Norrland Branch Stations during 1917–45. The origins of many well known Swedish varieties, e.g.

the Guldregn, [Golden Rain], Orion, Sol, Odal, Primus, Klock, Stormogul [Great Mogul], and Orion series, are mentioned with comments on their role in oat improvement in Sweden. (Cf. also *Plant Breeding Abstracts*, Vol. XVII, Abst. 1176).

871. HANSEN, H. H. H. 633.13:575(48.9)
Lokale Forsøg og andre Planteavlsarbejder. (**Local trials and other work on plant cultivation**).
Beretn. Planteavl. Lolland-Falster 1941 : 14–111.

Following an introduction, describing the methods in local field trials in Denmark with tables of results for 121 trials, the performance of Danish clovers, Danish and other wheats, rye and barleys is discussed in greater detail. The oat Minor gave a better average yield than the Swedish varieties Ørn and Fold in 1941 though conditions of cultivation were not in its favour. Seed of this oat was released for sale for the first time, under the name Abed Minor (Abed No. 17).

872. 633.13:575.11.061.633
FRÖIER, K. 633.13:575.242.061.633
The oat chlorophyll mutations *albovirescens*, *luteomaculata* and *tigrina* a —1.
Hereditas, Lund 1948 : **34** : 60–82.

A more detailed account is presented of the three chlorophyll mutations mentioned in a previous paper (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1721).
Plants of f. *albovirescens* appeared in an F_5 progeny of hexaploid oats from the cross 01422 b_2 x 01431 b, of which the origin is given. Reasons are put forward for attributing this phenomenon to spontaneous mutation of *Av* to *av* and not to segregation of polymeric factors. The segregation of the f. *albovirescens* plants is monofactorial. Morphological, anatomical and physiological observations on the f. *albovirescens* recessives are reported.
The form *luteomaculata* also occurs in hexaploid oats. Selection experiments showed that the progenies of typical f. *luteomaculata* plants are quite constant. The results of reciprocal crosses of f. *luteomaculata* plants with selection 01221 b Guldregn II [Golden Rain II] show that the inheritance of the factor is non-Mendelian and exclusively maternal, and reciprocal crosses with the hexaploid oat chlorophyll mutation f. *chlorina* from Guldregn I confirm this conclusion. The possible mode of transmission of the mutation by the female parent is discussed. The plastid degeneration as well as the morphological characteristics of the leaves of f. *luteomaculata* plants is described.
Tigrina-1 plants resulting from a spontaneous mutation were found in diploid *Avena strigosa* Schreb. Their characteristics are described. The segregation of f. *tigrina*-1 plants is monofactorial. Anatomical investigations revealed an advanced necrosis of chloroplasts. The mutation is compared with similar ones in barley, maize and wheat and induced mutations in oats.

873. 633.13:581.6(71)
MÉTHOT, P. 633.171–2.452–1.521.6(71)
La production végétale. (**Plant production**).
Rapp. Minist. Agric. Québec 1945 : 15–18.

The oat variety Roxton has proved superior to other varieties in Quebec. It is a medium late variety which gives a good yield of high quality grain with only a small percentage of bran.
The millet variety, Milton, is resistant to rust and gives a good yield. Drummond, a late variety, is also rust resistant; it comes into full flower about 10 to 15 days later than ordinary millet.

874. COFFMAN, F. A. 633.13–2.111–1.521.6:575(73)
Results from uniform winterhardiness nurseries of oats grown from 1942 to 1946.
J. Amer. Soc. Agron. 1947 : **39** : 1027–35.

The results of the uniform hardiness nursery tests of oats varieties and selections, carried out in the co-operating states during the period 1942–46, are surveyed. In general, Red Rustproof types have shown the least winter hardiness, whereas oats of the Culberson type and

certain strains of Fulghum have proved the most winter hardy. A strain of Winter Turf, possibly a derivative of red oats, and formerly considered the most hardy oats variety grown in the United States, was used as the control variety, as in the tests of previous years. The following varieties which were grown for one or two years during the period under review exceeded Winter Turf in hardiness: Tech, belonging to the Black Winter group; Hairy Culberson, Bicknell, and Wintock (Hairy Culberson x Fulghum C.I. 2500) among the Culberson group; C.I. 4207, a selection of the cross Fulghum (C.I. 2500) x Winter Turf 203–5, classed as belonging to the Winter Turf group; C.I. 4204, a selection derived from the cross Fulwin x (Lee-Victoria); Woodward strain (C.I. 3527); and the Fulghum derivatives, Fulghum (winter type C.I. 2499), Fulwin and Forkedeer. The results show general agreement with those obtained in previous years. Considering the results of 1942–46 and earlier, the most winter hardy varieties are as follows, in descending order of hardiness: Wintok, Fulwin, Hairy Culberson, Bicknell, Forkedeer, Fulghum (C.I. 2499) and Tech.

Progress in combining disease resistance and hardiness has not been marked. The Letoria and Stanton varieties derived from the cross Lee x Victoria, however, show a satisfactory combination of both characters, indicating the possibility of further progress in breeding for a combination of disease resistance and hardiness. Among selections produced from crosses of Fulghum and Red Rustproof, and their derivatives, a few strains have been obtained which are as hardy as the original Red Rustproof and Fulghum parents, but no exceptionally hardy disease resistant oats of either type has been developed. The most hardy disease resistant oats of the Fulghum type so far tested is Victorgrain (C.I. 3692); this variety was bred from a cross between Victoria and Fulgrain, the latter variety being developed from the cross Fulghum x Nortex. Fultex, derived from the cross Fulghum x Victoria, is almost as winter hardy as Victorgrain. Among the derivatives of Red Rustproof, Carolina Red, developed from the cross Nortex x Victoria has proved the most winter hardy. The need for breeding hardier oats of both the Fulghum and Red Rustproof types is emphasized. Since it is evident that all the more hardy oats grown in the United States include red oats in their parentage, it is obviously advisable to investigate red oats, including the wild red oats species, as probable sources of additional genes for winter-hardiness.

875. Stanton, T. R. 633.13–2.4–1.521.6:575.12(73)
Disease-resistant oats.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 395–402.

The use of the Victoria and Bond varieties as a source of disease resistance in oat breeding in the United States is outlined. Up to the present about 30 named varieties have been obtained directly or indirectly from crosses involving Victoria; seven named varieties have been developed from crosses using Bond.

876. Litzenberger, S. C. and
Murphy, H. C. 633.13–2.484–1.521.6:578.08(77.7)
Methods for determining resistance of oats to *Helminthosporium victoriae*.
Phytopathology 1947 : **37** : 790–800.

Various methods of determining the resistance of oat varieties to *H. Victoriae* under greenhouse and field conditions were compared at the Iowa Agricultural Experiment Station.

877. Miczyński, K. and 633.13.00.14(43.8)
Weiler, F. 633.491.00.14(43.8)
Wyniki doświadczeń z odmianami owsa i ziemniaków wykonanych w Dublanach w latach 1936–1938. (**Results of variety trials of oats and potatoes carried out at Dublany in 1936-1938**).
Rolnik Notowan. giełdy zbożowej Krakowie, Lwów 1939 : Pp. 20.

In 1936 and 1937 fifteen varieties of oats were tested, and seventeen in 1938.

The highest average yields of grain from 1936–1938 were given by Biały Orzeł (from Svalöf), Żółty Lochowa [Yellow Lochow] and Złoty Deszcz [Golden Rain]. Other relatively high-yielding varieties were Biały Mazur [White Mazur], Antoniński Biały [White Antoniński], Zwycięzca [Winner] and Antoniński Żółty [Yellow Antoniński]. Najwcześniejszy

Niemierczański [Earliest Niemierczański] gave the lowest yields. The average yields of Grzywacz and Zieleniak were relatively low, despite the good yields obtained from these late-ripening varieties in 1938 when crown rust prevailed. The highest average straw yields were obtained from Zwycięzca, Zieleniak, Grzywacz, Biały Orzeł, in descending order. Najwcześniejszy Niemierczański showed the lowest straw yield of all.
The highest 1000 corn weight was given by Sobieszyński followed in descending order by Ligowo, Biały Mazur, Antoniński Biały, with Najwcześniejszy Niemierczański showing the lowest value of all.
In 1938 owing to attack by crown rust the varieties Zwycięzca, Biały Orzeł and Ligowo had the lowest hectolitre weights, whereas Złoty Deszcz, Antoniński Żółty, Najwcześniejszy Niemierczański, Biały Mazur and Sobieszyński gave better values under these conditions. Najwcześniejszy Niemierczański was more than a week earlier than the other fourteen varieties. Teodozja was a typical late variety and Grzywacz and Zieleniak were the latest ripening.
As regards suitability for cultivation near Dublany, the Polish varieties Antoniński Biały and Biały Mazur gave the least variable high yields throughout the three-year period; of the foreign varieties Żółty Lochowa was most satisfactory whereas Biały Orzeł though also showing a high average yield was variable in performance, mainly owing to its high susceptibility to crown rust. Złoty Deszcz is also recommended. Trials carried out in other parts of Poland also showed the high value of Antoniński Żółty which except in 1938 gave yields similar to Żółty Lochowa.
In 1937 and 1938 twenty-two varieties of potatoes were tested for yield and starch content. The varieties Parnassia and Wekaragis ranked first as regards yield and were followed by Kmieć [Peasant], Wohltmann, Szafranki, Marszałek [Marshal], Rosafolia, Sandkrone and Białe Wczesne [Early White].
Parnassia, Wohltmann and Hetman had the highest starch contents, and relatively high values were also shown by Marszałek, Tytan [Titan] and Sandkrone, the lowest values being found for J.Ł. 25, Września [September] and Blauer Riesen [Blue Giant].
Trials made in 1931–1938 in other parts of Poland confirmed the high yields from Parnassia, Rosafolia and Wohltmann, whereas the varieties Hindenburg, Wekaragis and Marszałek gave considerably lower yields than in the trials at Dublany. E. W.

878. Buchli, M. 633.13.00.14(49.4)
Anbauversuche mit Hafersorten. (**Cultivation trials with varieties of oats**).
Mitt. Eidgen. Landw. Versuch. Oerlikon-Zürich Pp. 16.

For many years experiments were made at the Seed Testing and Seed Control Station at Mont Calme, Lausanne, and the Agricultural Association's Experimental Institute at Oerlikon-Zürich on varieties of winter and summer barley and also of oats, with the aim of producing useful barley and oat strains, by isolation of lines from the Swiss land varieties in general cultivation and by hybridization. The work on winter barley was successful but that on summer barley and oats was not, since the resulting pure and hybrid material, with few exceptions, could not compete with Swedish and other foreign varieties, especially as regards yield and resistance to lodging. Hence cultivation trials on oats were made in 1940–42 with the varieties Adliker, Goldregen I (Golden Rain I), Binder, the mutant Brune de Mont Calme and Petkus Flämingsgold, and in 1944–46 with the varieties Fichtelgebirgshafer II, Abed Minor, Sirius, Brune de Mont Calme, Petkus Flämingsgold, Petkus Flämingstreue, Panache de Roye, Goldregen I and Binder.
Petkus Flämingsgold, Petkus Flämingstreue and Abed Minor all proved reliable and gave good yields each year, in each locality; they differed however in resistance to lodging, thus Abed Minor, with its stiff thick straw, showed high resistance, whereas the Petkus varieties, which have long, fine, but rather weak straw, were less satisfactory and even in dry years lodging occurred. Brune de Mont Calme, widely grown in western Switzerland, also gave good results at Marsens and Bullet. This variety is grown at the foot of the Jura range and in subalpine regions; it is unsuited to German Switzerland where the rainfall is higher.
As regards straw yield, Panache de Roye, Brune de Mont Calme, Goldregen I and Petkus Flämingsgold gave good or very good yields. Abed Minor and Sirius gave medium to good

yields. Petkus Flämingstreue, with its very high grain yield, gave the lowest straw yield of all the tested varieties. E. W.

RYE 633.14

879. 633.14:575(47)
633.14:575.127.5:633.289

KRASNJUK, A. A.

(Preliminary results of breeding rye).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 20–22.

The rye variety Volžanka, produced by the method of free intervarietal pollination previously described (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1632) has yielded 2·0–2·5 c. per ha. more than Saratov 1, and the use of the method is being continued. Other improved varieties have been obtained by crossing winter with spring varieties. Spring rye converted into winter rye has proved just as winter hardy as the ordinary winter rye. Italian rye has given the highest yield in comparative tests.

A good form, comparing favourably with the standard, Saratov 1, in yield, thousand corn weight, number of grains per plant and other properties has been produced from crosses of *Secale* x *Agropyron cristatum*. This hybrid has been further crossed with *A. elongatum*. The hybrids were mostly perennial and characterized by great frost and drought resistance; they are still low in fertility but improve with each generation. Their grain is naked, with a thousand corn weight of about 5 grm., and low in germinating capacity. The hybrids, especially the triple hybrids, resemble the wild more than the cultivated parents; the triple hybrids moreover resemble *A. elongatum* more than *A. cristatum*. Dominance of the characters of the wild parent was also observed in crosses of cultivated rye with various wild species. In these hybrids the first generation grain resembles that of the mother plant and has a fairly high germinating capacity, especially the grain from open pollination. The second generation showed a certain amount of segregation but the characters of the wild species still mostly predominated; in the third generation a certain number of plants with tough rachis appeared and the grain quality improved; certain winter annual plants appeared in the later generations and were entirely of the cultivated type. They are thought to be interesting for breeding high yielding winter varieties of good quality.

880. 633.14:575(48.5)

LJUNG, E. W.

Råg. **(Rye).**

Sverig. Utsädesfören. Tidskr. 1946 : **56** : 255–60.

The history, extent and value of rye cultivation in Sweden are discussed as an introduction to the present brief account of rye breeding in that country during the past ten years. During that period and before it, the aims in breeding have remained unchanged, namely, the production of new, high yielding varieties, adapted to different regions of Sweden, sufficiently winter hardy, with short stiff straw and good quality of grain.

Varieties grown in southern and central Sweden are hardy enough, but in Norrland the ryes usually grown are damaged in some years in winter and spring by diseases as well as low temperatures. Hence local breeding of winter rye for the region is necessary. Similar work was started some years ago in Norrland and Värmland (cf. *Plant Breeding Abstracts*, Vol. XVIII, Absts 150 and 198).

The performance of the varieties Stål [Steel], Kungs [King's], Petkus, Petkus II, Agro and other varieties as regards yield, straw characters, grain quality and the tendency to germinate in the ear, a defect which seems least likely to occur in varieties with dense ears and firm, stiff glumes, are discussed from various aspects. Selection of new and promising lines from existing varieties, e.g., Stål and Östgöta Grå [Östgöta Grey], has produced Kungs II and another line 0302e which resembles Stål in external characteristics but has given somewhat higher yields and may possibly ultimately be found good enough to replace Stål. Line 37/29 derived from Östgöta Grå, which has given remarkably high yields, as compared with the mother variety and also in general, is to be further tested in eastern and northern Sweden.

Intervarietal hybridization also has been used to obtain transgressive types for yield and other characteristics. Among the potentially valuable lines thus obtained whose release is

under consideration are: 0801 b, from Stjärn x 0280, a selection from Prof. Heinrich rye, with stiff straw and high uniform yield; Sv 36/28, from Malm x a Finnish rye, considerably higher yielding than the parents; and 0460, from Stål x 0590 (a selection from midsummer rye), with high yield, but weak straw. The Västernorrland Branch Station has been responsible for the production of Björn (cf. *Plant Breeding Abstracts,* Vol. XI, Abst. 125) also by hybridization.

The constant maintenance of the purity of varieties already put on the market, and the regular production of new élites of such varieties is another important task in Swedish rye breeding.

881. WAGNER, S. 633.14:575(49.4)

Der Stand der Sortenfrage beim Winterroggen auf Grund der Versuche in den Jahren 1942–1945. (**The position as regards varieties in the case of winter rye, as deduced from trials in 1942–1945**).

Mitt. Eidgen. Landw. Versuch. Oerlikon-Zürich Pp. 12.

Trials were made with the following varieties of winter rye, Mont Calme, Witzwil, Lenzburg, Adlikon and Rothenbrunnen, which were compared with Petkus Normal Straw rye, later named Petkus Original. Two other ryes were also included (1) a Petkus rye cultivated for years in parts of the canton of Bern and here called Petkus Nachbau and (2) the so-called PRA rye, a triple hybrid progeny from Petkus, Rothenbrunnen and Anatolian ryes, the latter having been used in the cross because of the good quality of the grain and resistance to lodging.

Tables showing the performance of the varieties are given. Differences in winter hardiness were not great; Petkus Nachbau and Lenzburg withstood a severe attack of snow mould best of all, but during 1943–45 Petkus Original proved the most winter hardy. In resistance to lodging, Rothenbrunnen surpassed Petkus Original. Petkus Nachbau only proved better than the weaker Swiss varieties. Adlikon and Lenzburg ripened earlier than the other varieties; the other Swiss varieties and Petkus Nachbau were medium early and here intercrossing between the latter and neighbouring Swiss varieties probably caused the similarity in earliness; PRA and Petkus Original were markedly late ripening, the effect of Petkus rye in the hybrid being obvious here. The grain yield of Petkus Original surpassed all others by a wide margin; partial sterility still persisted in the Swiss varieties; Mont Calme gave the lowest yield and that of Petkus Nachbau was exceeded by Witzwil, the highest yielding Swiss variety. Petkus Original showed the highest straw yield and Mont Calme the lowest. The crude protein content of Petkus Original was lower than that of the Swiss varieties or Petkus Nachbau; PRA rye showed the influence of the Petkus variety in that the straw yield was the lowest of all. E. W.

882. DUMON, A. G. 633.14:575.11

Contribution à la génétique et à l'amélioration du seigle (*Secale cereale* L.) [**Contribution to the genetics and improvement of rye (*S. cereale*)**].

Agricultura, Louvain 1947 : **45** : 213–23.

An account is given of the genetics of characters in rye which are of interest to the plant breeder. It is based largely on Roemer and Rudorf's "Handbuch der Pflanzenzüchtung" (cf. *Plant Breeding Abstracts,* Vol. IX, p. 252), but contains also the results of the author's own research.

883. 633.14:576.356.4

MÜNTZING, A. 633.14:576.353

Cytological studies of extra fragment chromosomes in rye. IV. The position of various fragment types in somatic plates.

Hereditas, Lund 1948 : **34** : 161–80.

It is shown that the chromosomes in rye are grouped in the somatic metaphase plates according to size; the standard fragment and its derivatives, which are smaller than the normal or A-chromosomes, occupy a central position. The reasons for this are discussed. It would appear that the accessory chromosomes have centromeres of the same strength as those of the A chromosomes. In the variety Östgöta Gråråg [Östgöta Grey], the accessory chromosomes are more central in position than in Vasa II. They are also shorter but the

difference in size is considered insufficient to account for the difference in position on the metaphase plates, which is probably due to structural or genetic differences inherent in the fragments, since they retain their differential behaviour in hybrids between the two varieties. The fragments of these varieties differ also in their frequency of pairing at meiosis.

884. HÅKANSSON, A. 633.14:576.356.4
Behaviour of accessory rye chromosomes in the embryo-sac.
Hereditas, Lund 1948 : **34** : 35–59.

An account is given of the observations of various investigators on the morphology and behaviour of the accessory chromosomes in rye. The fact that there is almost always an even number of these fragments is attributed to their non-disjunction at pollen mitosis or a corresponding non-disjunction on the female side according to which parent contributes them. Evidence is mentioned of such non-disjunction of accessory chromosomes in the pollen of *Anthoxanthum aristatum* and of maize.

With the object of demonstrating cytologically the non-disjunction which must occur on the female side, the author made and examined sections of spikelets of about 80 rye plants. Chromosome numbers were determined from root tip counts, and in plants with six fragments, first pollen mitosis was also studied.

It was found that some of the fragment accessory chromosomes show non-disjunction at the first division in the embryo sac and the daughter chromatids are usually included in the micropylar nucleus. At the second and third divisions the fragments behave normally. In spores containing a single fragment chromosome mitosis is normal; in spores with two fragments it is disturbed to some extent; in spores with three it breaks down and results in the formation of deficient nuclei, supernumerary nuclei or, less frequently, a restitution nucleus. The later divisions, also, in the embryo sacs of plants with six accessories are often disturbed. As a result of anomalies of division, the fertility of such plants is reduced. These results are discussed in relation to the findings of other workers.

885. MÜNTZING, A. and AKDIK, S. 633.14:576.356.4
The effect on cell size of accessory chromosomes in rye.
Hereditas, Lund 1948 : **34** : 248–50. (Abst.)

The analysis of data concerning the length of stomata in rye plants with accessory chromosomes leads to the conclusion that both standard fragments and large iso-fragments cause an increase in cell size in the material examined.

886. BAC, S. 633.14–2.111–1.521.6(47.1)
O wymarzaniu ozimin. (**On the winter killing of winter cereals**).
Przegl. Roln. 1947 : **2** : 217–19.

Four unspecified varieties of rye were studied, which had already been graded for frost resistance at the Agricultural Station at Tikkurila, Finland. The roots were examined separately during autumn, winter, spring and summer and compared with the roots of spring rye. It appeared that the extensibility of the roots in winter is characteristic for each variety. Results also showed that frost resistance is directly related to the extensibility of the roots. E. W.

887. VAN DEN BRANDE, J. and VAN ONSEM, J. 633.14–2.6–1.521.6(49.3)
Het stengelaaltje *Ditylenchus dipsaci*, van de Rogge. [**Stem eelworm of rye.** (***Ditylenchus dipsaci***)].
Meded. LandbHoogesch. Wageningen 1947 : **12** : 213–29.

This is a report of an investigation into the distribution of the eelworm in the rye plant, the symptoms of infestation, its spread through the soil and other methods of dispersal, the susceptibility of weeds, and the effect of dung and fertilizers on the degree of infestation. As a result of a variety trial in a heavily infected field, confirmed by an experiment at the institute where soil was artificially infected, only the variety Ottersum showed resistance to the pest. The other kinds tested were Korte Vlaamse (Short Flemish), Eekloo, Vlaamse Reus (Flemish Giant), Waregem, Petkus, Brandt's Marien, Lange Vlaamse (Tall Flemish) and Koning (King). C. B.

888. WELLENSIEK, S. J. 633.14–2.6–1.521.6:575:578.08
Methoden voor het kweken van aaltjes-resistente rogge en enkele hieruit voortvloeiende consequenties voor de roggeveredeling in het algemeen. (**Methods of breeding rye resistant to eelworm and some of the consequences affecting rye breeding in general**).
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 6th Mtg 30 November, 1945 Wageningen No. 45/1 : 35–37. (Mimeographed).

Resistance is a dominant character and a method of breeding homozygous resistant plants has been worked out theoretically. After four generations of line selection a population is obtained that will segregate only 0·2% of susceptibles. Such a result can be obtained by mass selection in 20 generations. No further progress can be made in this way, but by using clones a completely satisfactory result can be obtained in two or three years.
Experimental crossing either of individual clones with a susceptible variety or by bulk crossing between all clones, provides no permanent result. It can, however, be combined with vegetative multiplication of the clones selected or with simultaneous crossing by pairs. The former is difficult to carry out and requires three years, but the latter is easily-done and requires two years.
The most elegant method is to make diallel crosses of all clones, but this gives rise to a large quantity of material and requires three years. Inbreeding by self-pollination gives results in two years but causes a great deal of work. If selection is to be based on yield, this last method cannot be used, and crossing in pairs accompanied by simultaneous mass crossing or by a breeding test must be used
The discussion that followed became so animated over the question of inbreeding that the minutes are incomplete.
Potato eelworms can attack rye, but apparently do not. C. B.

889. 633.14.00.14(48.1)
ELLE, T. 633.14–1.524:575"793"(48.1)
Sortforsøk med høstrug. (**Variety trials with autumn rye**).
Meld. Stat. Forsøksgard Møistad 1941 (1942) : H33–48.
Meld. Stat. Forsøksstasjoner Plantekult. 1941 (1943).
Tillegg H til Landbruksdirektorens årsmelding 1941.

The ryes tested between 1935 and 1941 included the bred varieties: Vasa, Petkus, Stål (Steel], Kongs [King's], Malm, and the Svalöf strain Å 34/95; the Norwegian land varieties, Hove (or Hedmarksrug), and Refsum; and the Estonian rye Sangaster.
Yields, grain and straw quality, and over-wintering capacity were the main criteria recorded. Details of the performance of the different varieties are given. Refsum and Hove can be recommended for growing under certain difficult conditions of soil or season; Hove was the more winter hardy, but also the more leafy, of the two and might tend to lodge in soil in good heart.

MAIZE 633.15

890. RAMIREZ, H. 633.15:519.24:581.4
Estudio estadístico comparativo sobre dos variedades de maíz. (**Comparative statistical study of two varieties of maize**).
Rev. Fac. Nac. Agron. Colombia 1946 : **6** : 375–92.

A comparative biometric study has been made of the morphology of the two maize varieties Venezuela-1 and Cuba Blanco [White Cuba]. Correlations between the various characters investigated were worked out.

891. CAROLIS, V. DE 633.15:575(45)
La coltivazione del granoturco in provincia di Cremona.
(**Maize cultivation in the Cremona province**).
Ital. Agric. 1946 : **83** : 497–507.

The general conditions of maize cultivation under which it is possible to obtain over 60 quintals per hectare are described. Several new varieties produced by the Bergamo maize research station or imported from the U.S.A. have been tried but none so far has excelled the local variety Taiolone, which is an early maturing form giving a high yield of grain but

low yields of leaf and straw. Crossing of inbred lines as in the U.S.A. has not been practised but intervarietal crosses such as Taiolone x Nostrano dell' Isola have proved very vigorous.

892. Lupetti, R. 633.15:575(45)
Tre nuove razze di granoturco. (**Three new races of maize**).
Ital. Agric. 1943 : **80** : 367–73.

The three varieties described are all hybrids of the popular Italian maize Marano. The first F.55, a complex hybrid in which Marano, Nostrano dell' Isola and Ibrido Bergamasco [Bergamo Hybrid] participated, is resistant to wind and drought, equal to Marano in yield, and a day or two later in ripening. F.11, a hybrid of Marano, Scagliolo 23A, Nostrano dell'Isola and Ibrido Bergamasco, is also resistant to wind and also to hail damage and is a few days later than Marano. F. 92 is a hybrid of Marano, Scagliolo 23A, Nostrano dell'Isola and Minnesota, and, though a tall variety, it resists wind fairly well; its ears are extremely regular.

All three varieties have produced average yields of over 50 quintals of dry grain per hectare, and in exceptionally favourable conditions have touched 80 quintals.

893. Dekaprelevič, L. L. and 633.15:575(47)
Dgebuadze, E. K. 633.15:581.331.2:575.125
(**Breeding and seed production work with maize in Georgia**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 23–28.

The maize types occurring in the different parts of Georgia are described. Dent and semi-dent types predominate today; all are very mixed but well adapted climatically and none of the hybrids introduced from the U.S.A. has equalled them in performance in western Georgia. Ear-to-row selection has been applied but led to too close breeding and has been replaced by mass selection; more recently pollination with a mixture of pollen from 20–25 plants has been applied. Experiments have shown that pollination from one plant gives a yield of only 90–93% of that obtained by open pollination, whereas pollination from 25 plants gives yields of 112–123%; the latter set were also more resistant to *Fusarium*. A number of intervarietal crosses have also been made.

In eastern Georgia, Reid's Yellow Dent, introduced from America, has exceeded the local standard variety Krug; so did an American variety introduced many years ago and locally adapted, both in yield and earliness, and is being subjected to further selection.

A number of crosses were made involving American and local varieties, and out of 156 different hybrids tested 35 have exceeded the standard in yield, the differences varying from 12·1 to 24·5%. The best hybrids were mostly those from crossing dent corns with local Georgian semi-dents. Attempts are now being made to produce synthetic hybrids with "fixed heterosis".

894. Fornaci, C. 633.15:575"793"(45)
Varietà italiane di granoturco precoce. Il granoturco Ottofile vogherese. (**Italian varieties of early maturing maize. The maize Ottofile Vogherese**).
Ital. Agric. 1943 : **80** : 313–37.

The maize in question is a selection from a local variety from Pavia Province north of the river Po, and has yielded between 25 and 45 quintals of grain per hectare even in the driest seasons. It is thus drought resistant, has a very vigorous root system, and short robust stems which make it resistant to wind. The ears bear 295 to 300 grains, invariably in 8 rows, with a thousand corn weight of 350 grm. Sown between 15 and 25 April in the Po valley it ripens towards the end of September.

895. Parenti, E. 633.15:575"793"(45)
Tre ottime varietà di mais primaverili. (**Three excellent varieties of spring maize**).
Ital. Agric. 1944 : **81** : 117–29.

The three varieties in question, Trionfo di Aquileia, Dentato Friuli and Dorato Friulano, are selections of the American varieties Silvermine, Wisconsin Giant and Maule's Mastodon respectively, introduced into Italy in the period 1928 to 1932.

896. Del Valle, C. G. 633.15:575.12(72.91)
Estudios genéticos sobre el maíz. 3. Aplicación en Cuba del sistema de auto-polinización y cruce. (**Genetical studies on maize. 3. Application in Cuba of the system of selfing and crossing**).
Bol. Estac. Agron. Cuba 1944 : No. 61 : 53–63.

The method of producing hybrid maize by crossing suitable inbred lines is regarded as too costly for Cuba, where the maintenance of inbred lines is said to be difficult.
Four alternative maize breeding techniques are suggested: (1) crossing 10 or 12 inbred lines to form a synthetic variety, after a preliminary test of combining ability; (2) producing hybrids from inbreds only partially homozygous that have been selfed for only 2 or 3 generations; (3) combining 20 selfed ears that have exceeded a test variety or their own parents in yield in a preliminary test; and (4) importing hybrids from abroad and breeding from these.

897. 633.15:575.12(75)
Coelho, C. 633.61:575(73)
Palestra sôbre o melhoramento de milho e cana de açúcar nos Estados Unidos da América do norte. (**Account of the improvement of maize and cane sugar in the United States of America**).
Bol. Sec. Agric., Pernambuco 1946 : **13** : 181–90.

A report is given of observations made by the author while visiting the University of West Virginia in order to acquaint himself with methods of producing single and double cross maize hybrids, and while visiting the Federal Research Station, Canal Point, Florida, to examine sugar cane breeding methods.

898. Jenkins, M. T. 633.15:575.12(73)
Corn hybrids for the South.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 389–94.

Progress in development of hybrid maize for the southern states is reviewed.

899. 633.15:575.12(94)
Hybrid maize—plans to speed production.
Agric. Gaz., N.S.W. 1947 : **58** : p. 422.

A note is given on plans to increase hybrid maize production in Australia, with particular reference to work in New South Wales. At the Grafton farm, the production of mid-season and late maturing hybrids suitable for the coastal districts is receiving attention. Early maturing types for tableland conditions are being developed at the Glen Innes farm, while mid-season types for the lower south coast and south-west slopes are being bred at the Hawkesbury Agricultural College.

900. Braithwaite, M. 633.15:575.12:581.6(71.3)
White hybrid corn in Ontario.
Canad. Geogr. J. 1947 : **35** : 189–95.

In 1946 white hybrid maize was grown successfully on a commercial scale in the extreme south-western region of Ontario for the first time in the history of maize production in Canada. In the unfavourable season of 1946, the average yield for the total acreage of 19,000 acres sown with white hybrid maize was 30–40 bushels of grain per acre; some fields gave yields as high as 80 bushels per acre. The white form of maize is superior to the yellow for the manufacture of cornflakes; and the commercial production of white hybrid maize in this region entails the development of a new and important agricultural industry. All the seed was imported from the United States. As soon as parent stocks are available white hybrid seed production will be undertaken by growers in the area.

901. Smits, C. 633.15:575.125(49.2)
De ontwikkeling van de teelt van korrelmais in ons land. (**The development of maize cultivation in Holland**).
Tijdschr. Ned. Heidemaatsch. 1947 : **58** : 279–80.

The area cultivated in Holland has increased steadily from 272 ha. in 1936 to 3765 ha. in 1946 and 4363 ha. in 1947. Attention is called to the new technique of crossing, developed in America during the war, that results in heterosis and yield increases of 25% to 40%. C.B.

902. Del Valle, C. G. 633.15:575.125(72.91)
Estudios genéticos sobre el maíz. 2. La prueba y utilización de las líneas homogéneas. (**Genetical studies on maize. 2. The testing and utilization of homogeneous lines**).
Bol. Estac. Agron. Cuba 1944 : No. 61 : 35–52.

Data are presented on the productivity of the maize inbreds obtained by the author. These were tested for combining ability by crossing with a test variety, Habana P1-F, and by crossing *inter se*. Although it proved impossible to predict combining ability from the productivity of the inbreds, the highest yielding single crosses were derived from high yielding inbreds.

In comparisons of single, double and 3-way hybrids, it was noted that the yields of the double and 3-way hybrids were much affected by the order in which the inbreds were combined.

903. Pirovano, A. 633.15:575.125:575.243
Sugli effetti di una spiccata eterosi nel mais. (**On the effects of a marked heterosis in maize**).
Ann. Sper. Agrar. Roma 1947 : **1** : 17–25.

In crosses between an Australian Gold Dent maize and the dwarf mutant produced by the author's electromagnetic treatment (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1641), a wide range of types appeared in the F_1 generation, a large number of them being giant plants, some of which bore very large ears, on which the most irregular segregation was observed for such characters as number of rows, grain colour, etc. The heterosis was maintained in the F_2 generation from some of the ears but to a lesser degree; great variation in this respect was observed in the progenies of different ears. In the ears with 18 and 24 rows, between 15% and 65% of the grains were incapable of germination; dwarf plants and albinos appeared among the F_2 plants.

A yellow grained form of the same dwarf mutant was crossed with the early maize variety Attilio. The proportion of dwarf forms in the F_1 generation varied from 16·6% to 60·6% among the plants with yellow seeds and from 18·2% to 30% in those with greenish-white seeds. This cross was very promising from a practical point of view.

904. Del Valle, C. G. 633.15:575.14
Estudios genéticos sobre el maíz. 1. La producción de líneas homogéneas. (**Genetical studies on maize. 1. The production of homogeneous lines**).
Bol. Estac. Agron. Cuba 1944 : No. 61 : 3–34.

Methods are outlined for obtaining inbred maize lines, and for selecting them for productivity. Several abnormal segregates obtained by the author are described.

905. Jugenheimer, R. W.,
Leng, E. R. and
Woodworth, C. M. 633.15:575.14(77.3)
Two new Illinois inbred lines of corn.
Bull. Ill. Agric. Exp. Sta. 1947 : No. 523 : 393–400.

Data are given on the new inbred lines of maize, R59 and R61, and on single and double crosses containing either of these new inbreds.

Inbred R59 was developed from the cross Iowa L317 x Illinois Low Ear back-crossed once to L317, and then selfed until uniform. The line may be substituted for L317 in hybrid combinations. Hybrids containing R59 in their parentage are superior in yield to those containing L317; they also have lower ears, slightly larger ears, and a higher shelling percentage.

Inbred R61 was produced from a commercial hybrid which was crossed with a four-year selfed line from Lancaster yellow dent, and back-crossed once to the Lancaster line. In hybrid combination R61 appears to be equal or superior to several standard inbreds.

906. Jones, D. F. 633.15:575.17
The nature of gene action as shown by cell-limited and cell-diffusible gene products.
Proc. Nat. Acad. Sci. Wash. 1947 : **33** : 363–65.
Examples are cited of genes in maize which produce their effect only in the cell in which they occur, or in several cells, respectively. The mechanisms involved are discussed and it is concluded that the interaction of different genes and of different allelomorphs of the same gene occurs in the cytoplasm in some cases.

907. Choudhri, R. S. and
Krishan, R. 633.15:575.41:581.143.26.035.1
On the place of origin of *Zea Mays*.
Sci. and Cult. 1946 : **11** : 504–05.
Day length is discussed as a factor in the natural selection of species. Since, in *Zea Mays*, an adequate balance between the vegetative and reproductive phases is induced, among other things, by a photoperiod of about 12 hours it is suggested that this species originated in a region where day-length approximated to 12 hours, i.e. in or near the equatorial belt. It is generally agreed that it originated in the New World but many different centres of origin have been suggested. Most of these with the exception of Paraguay and Northern Mexico lie within 15° north or south of the equator.

908. Andersson, G. 633.15:575.42(48.5)
Majs. (**Maize**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : p. 321.
Experiments with maize in Sweden were begun in 1935 by the Swedish Farmers' National Union [Svenska Lantmännens Riksförbund] to test the suitability of early foreign varieties for Swedish conditions. The Canadian variety Manalta proved best, even though some German and Danish varieties that were later gave higher yields under favourable conditions. In 1939, record yields up to 7800 kg. of grain per ha. were obtained, but for other years yields of 2000–3000 kg. per ha. were recorded, and in some cases even the relatively early Manalta failed to ripen completely.
Selection from Manalta and other early varieties and intervarietal crossing have been carried out to obtain forms combining earliness and good yield.
Whether maize, which requires warmth, will ever become a reliable crop in Sweden is however uncertain.

909. 633.15:576.12:575.12(73)
633.15:581.142:575.11(73)
Haskell, G. 635.67:576.12:575.11
Corn (*Zea Mays* L.) genetics in the United States.
Nature, Lond. 1948 : **161** : 42–44.
The following problems connected with the genetics and breeding of maize are discussed: the estimation of combining ability of inbreds used in the production of hybrid seed; the shortening of the time now occupied by inbreeding lines until they are sufficiently homozygous for use in hybrid combinations; the occurrence of degenerative changes in the hybrids; breeding for various useful characters; the principles underlying the ability of some lines and not others to germinate after remaining under cold soil conditions; the origin and history of maize.

910. 633.15:576.16:575.127.5
Brieger, F. G. 633.15:575.113.5
Estudos experimentais sôbre a origem do milho. (**Experimental studies on the origin of maize**).
An. Escola Sup. Agric. "Luiz de Queiroz" Univ. S. Paulo 1944 : No. 10 : 225–78.
An attempt has been made to obtain a primitive maize type by crossing the comparatively simple São Paulo pod corn (tunicate) with *Euchlaena* in the hope of breaking up the "domesticated" modifier complex. In the F_2 back-cross generation of this cross, a plant was obtained with a thin, flexible and non-brittle rachis, and with grains having a basal abscission layer, and protected by prominent corneous glumes.

It is suggested that such a plant may have crossed with a tripsacoid grass, possibly *Tripsacum australe* itself, to give offspring devoid of abscission layers in the grain and non-tunicate. Such a form would then be likely to attract the interest of Indian cultivators.
In support of this suggestion, it is stated that possibly tripsacoid characters have been noted in indigenous maize varieties from Central South America. Also intergeneric hybridization may account for the large number of lethal and semi-lethal factors in cultivated maize.
The many-rowed ear is regarded, not as a fusion product, but as a consequence of modified phyllotaxy.
The locus of origin postulated by the author is the lowland region of Central South America, where the maize types are extremely uniform over a large area.

911. CHOUDHRI, R. S. and KRISHAN, R. 633.15:576.312.332:581.02:577.17
Sex differentiation in *Zea Mays*.
Sci. and Cult. 1946 : **11** : 472–75.

The relative importance of environment and heredity in the sex determination of plants is discussed. A hypothetical mechanism in maize is outlined, involving the interaction of genes and hormones.

912. ROMAN, H. 633.15:576.356.4:576.356.1
Mitotic nondisjunction in the case of interchanges involving the B-type chromosome in maize.
Genetics 1947 : **32** : 391–409.

Investigations were carried out on an X-ray induced interchange between the B type chromosome of maize and four of the basic A set of chromosomes, in order to determine the cause of the anomalous behaviour of the B type chromosome (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 454).
Even when a relatively high number of B chromosomes are present, the B chromosome does not produce a specific genetic effect. From crosses in which only one of the parents carried one or two B chromosomes, plants were obtained with two or more B chromosomes, instead of the expected plants with only one B chromosome. The proportion of these anomalous plants was particularly high when the B type chromosomes were transmitted by the male parent, i.e., in the crosses 0B x 1B and 0B x 2B.
Indication was obtained from chromosomal counts of the microspore nuclei formed as the result of meiosis that chromosomes of the B type undergo disjunction in meiosis. This observation suggested that 1B microspores give rise to 0B and 2B gametes by non-disjunction in one of the mitotic divisions in the microspore. In order to test this possibility A–B interchanges were induced by X-ray treatment. Plants heterozygous for an A–B interchange could be expected to produce 25% defective pollen since one of the two deficient spore types lacks only the B chromatin and this deficiency does not alter the appearance of the pollen. Cytological identification of plants heterozygous for an A–B interchange was possible either at pachytene or diakinesis.
Eight A–B interchanges were obtained; the present paper deals with the investigations on only one of these interchanges, viz. an interchange involving chromosome 4, termed TB–4a. The study of the other interchanges is still in the preliminary stage.
The results of crosses involving plants homozygous for the interchange TB–4a show that the interchange chromosome B^4 undergoes non-disjunction in the second mitotic division of microsporogenesis. The gametes with chromosome B^4 in duplicate and with a deficiency for this aberrant chromosome are both functional. Non-disjunction of this chromosome occurs in most, if not all, of the second mitoses in the microspore. The seeds obtained from a cross between a pollen parent homozygous for the interchange TB-4a and a normal female parent are therefore of three kinds: (1) seeds with an endosperm deficient for the B^4 chromosome and an embryo carrying this chromosome in duplicate; (2) seeds with a hyperploid endosperm and an embryo deficient for chromosome B^4; and (3) seeds with a euploid endosperm and an embryo heterozygous for the interchange TB–4a.
The interchange chromosome which undergoes mitotic non-disjunction carries the centromere and proximal third of the B type chromosome. The other interchange chromosome

carrying the distal two-thirds of the B type, disjoins normally. The preliminary study of five other A–B interchanges has also shown that the aberrant chromosome is in each case the one carrying the B centromere.
It was found that the B^4 chromosome is relatively stable in the development of the endosperm, in contrast to its behaviour in microsporogenesis.
Mitotic non-disjunction, as demonstrated in the case of chromosome B^4, explained the transmission of the intact B type chromosome in most particulars.
The localization of the chromosomal component associated with mitotic non-disjunction is discussed, with reference to these results and those obtained by other workers on maize, rye, sorghum and *Sciara*. The data suggest a general relationship between mitotic non-disjunction and the position of the centromere. Recent investigations on rye by Müntzing (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1238), however, suggest that the centromere may not be the only chromosomal component responsible for mitotic disjunction, since lagging due to the failure of a region near the centromere to divide in concert with the remainder of the chromosome was observed.
Several possible uses in genetical and cytological studies that can be made of the aneuploids produced as a result of A–B interchanges are indicated.

913. Hunt, C. H.,
Ditzler, L. and
Bethke, R. M. 633.15:577.16:575.12(73)
Niacin and pantothenic acid content of corn hybrids.
Cereal Chem. 1947 : **24** : 355–63.

Double cross maize hybrids grown at different experiment stations for two or three seasons were sampled for their niacin and pantothenic acid contents. In the case of niacin, the data showed that the observed variation in content was mainly genetical. In the case of pantothenic acid, however, the variation in content proved to be mainly due to the seasonal factor. The inherited ability to synthesize niacin was therefore less subject to environmental factors than the inherited capacity to synthesize pantothenic acid.

914. Brink, R. A. and
Cooper, D. C. 633.15:581.141:575.11
Effect of the *De 17* allele on development of the maize caryopsis.
Genetics 1947 : **32** : 350–68.

A study was made of the effect of the recessive gene, *de 17*, which in the homozygous condition causes defective seed. Kernels of the genotype *de 17 de 17* weigh 25% less than kernels carrying the factor *De 17*. A large proportion of the embryos, however, are viable, and produce seedlings which are able to grow into vigorous and fertile plants, although when mature these plants are approximately one foot shorter than those carrying the factor *De 17*.
Histological examination showed that in the defective kernel the cells in the basal portion of the endosperm fail to differentiate into absorbing tissue during the first six to 12 days of kernel development, as in the normal seeds, and that these and adjacent cells gradually collapse; the absorption and transfer of nutrients are therefore interrupted, with the result of limited seed development.
It is suggested that the shorter stature of mature plants homozygous for *de 17* may be due to either the disadvantage of poor kernel development in the initial growth of the seedling, or to this disadvantage combined with a mildly deleterious effect of the gene *de 17* on subsequent growth.

915. Aurand, L. W.,
Miller, R. C. and
Huber, L. L. 633.15:581.192:575
The influence of heredity on the carotene content of corn.
Science 1947 : **106** : 493–94.

After referring to literature on the genetics of factors involving the nutritive value of the grain in maize, the authors describe their own investigation of the carotene content of grain from all possible single cross combinations except one of ten inbred lines of yellow dent corn. On the average, combination of Nebraska 6 and Wisconsin 8 with other inbreds

produced grain with the highest carotene content. The combination of these 2 varieties gave the highest value of all. It is concluded that different strains of yellow maize may vary widely in carotene content and that their carotene content may be largely determined by genetic constitution.

916. BRIEGER, F. G. 633.15:581.331:575.11
A ação dos gens gametofíticos com referência especial ao milho. (The **action of gametophytic genes with special reference to maize**).
An. Esc. Sup. Agric. "Luiz de Queiroz" Univ. S. Paulo 1945 : **2** : Sep. No. 19 : 269–97.

Genes affecting the mutation rate of other genes or meiosis, or bringing about elimination of one or other of the gametophytes or of the embryo are discussed, in particular those known in maize. Special attention is devoted to pollen tube competition. A list of the gametophyte factors located up to the present in maize is given.
Harland's suggestion (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 690) that gametophyte factors might be used to develop varieties resistant to outcrossing is briefly considered.

917. BRIEGER, F. G. 633.15:581.331:575.11
Competição entre megaspórios em milho. (**Competition between megaspores in maize**).
An. Esc. Sup. Agric. "Luiz de Queiroz" Univ. S. Paulo 1945 : **2** : Sep. No. 18 : 239–67.

The gene *sp* 1 for small pollen also inhibits pollen tube development. Genes *Su* 1 and *Sp* 1 are linked on chromosome IV. In addition to inhibiting pollen development, *sp* 1 also inhibits megaspore formation, though to a lesser degree. Elimination of megaspores carrying *sp* 1 is greater in the upper half of ears than in the lower half. Since ears carrying *sp* 1 are well filled, with just as many kernels as normal ears, it is concluded that the elimination of cells carrying *sp* 1 occurs through competition between the megaspores, and not by abortion of the female gametophyte.

918. 633.15:581.46:575.11
BRIEGER, F. G. 633.15:581.331.23:575.11
Estudos genéticos sôbre o milho tunicata. (**Genetical studies on tunicate maize**).
An. Esc. Sup. Agric. "Luiz de Queiroz" Univ. S. Paulo 1945 : **2** : Sep. No. 17 : 209–38.

The São Paulo and Bolivian pod corns are each homozygous for the gene *Tu* determining tunicate inflorescences. The São Paulo pod corn is heterozygous for a gene *ga*4 which inhibits pollen tube development. The genes *Sul*, *Tu* and *Ga*4 are linked in that order on chromosome IV.
It is noted, in view of the various peculiarities of chromosome IV, that Mangelsdorf and Reeves have suggested that it may contain translocations from *Tripsacum* (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 760).

919. HERZKA, A. 633.15:581.48
Notes on maize.
J. Soc. Chem. Ind., Lond. 1947 : **66** : 396–97.

Investigations on the structural characters of the maize grain which are responsible for popping are reported. It was found that the following events, occurring in rapid succession result in the popping of the grain. The excess sap of the leuciderm turns into steam; steam is also formed within the starch grains of the leuciderm. The pressure thus exerted by the leuciderm on the surrounding tissue is resisted by the starchy gluten layer. This resistance ceases as soon as the cell sap absorbed by the starch grains of the starchy gluten is turned into steam; at this point the popping of the grain occurs. Some of the horny gluten and some of the starchy gluten remain unchanged, while part of the starch is hydrolysed.
The factors necessary for the popping of the grain of any given variety are indicated. These are as follows: (1) a circular or nearly circular outline of the grain in transverse section; (2) the leuciderm should be equidistant from the pericarp, not less than 0·3 of the

thickness of the kernel in transverse section, and club-shaped in vertical section; and (3) the embryo should not extend beyond half the complete length of the kernel. In all cases popping occurs at the apex of the kernel and not at the micropylar end.

920. Graner, E. A. 633.15:581.483:575.113.4.061.6
Gen Y7, complementar de Y1 e Y3 para a coloracão amarelo-laranja da semente de milho. (**Gene Y7, complementary to Y1 and Y3 yellowish-orange coloration of maize grain**).
Rev. Agric. Brazil 1947 : **22** : 42–54.

Gene *y7* arose as a spontaneous mutation in a North American maize line. The locus of the gene pair *Y7 y7* is probably on chromosome 7.
Gene *Y7*, in the presence of genes *Y1* and *Y3* determines yellowish-orange endosperm. If the gene *YD* is also present, the endosperm becomes orange, while its recessive allele tones down the colour to yellow. Additional modifiers give rise to various other shades of pigmentation in the yellow-orange series.
If any one of the genes *Y1*, *Y3* or *Y7* is replaced by its recessive allelomorph, yellowish-orange pigmentation of the endosperm is inhibited, *y3* determines albescent seedlings and *y7* albino seedlings.
Gene *Y5*, when present in the gene combination *Y1y3Y5*, determines yellow endosperm.
In the presence of *Bn*, which determines pigmentation in the aleurone layer, and in the absence of any one of the dominant genes *Y1*, *Y3* or *Y7*, the maize grains appear lemon-yellow.

921. 633.15:581.483:577.15:575.17
Cameron, J. W. 635.67:581.483:577.15:575.17
Chemico-genetic bases for the reserve carbohydrates in maize endosperm.
Genetics 1947 : **32** : 459–85.

The relationship between genes and the carbohydrate metabolism of maize endosperm has been investigated by studying the effects of the 16 possible combinations of the two gene pairs, Su_1 su_1 and *Du du*. The amounts and kinds of carbohydrates present in the different genotypes were determined. The change detected in the proportions of the straight and branched-chain molecules composing the starch grains indicates gene control over the activities of the enzymes responsible for the formation of these molecules. The properties of phosphorylase and the "Q" enzyme are discussed with reference to the author's own investigation and the work of others. It is concluded that the genetic effects in the present case are probably not the result of "all or none" reactions, but of changes in the degree to which processes, occurring in even the lowest member of the series, proceed.

922. Constancio Lazaro, R. 633.15–1.524:575.12(89)
Primera comunicación de trabajos de fitotécnia del maíz. (**First report on the plant breeding work on maize**).
Rev. Asoc. Ingenieros Agron. Montevideo 1946 : **18** : No. 75 : 11–23.

Extensive tests have been made of maize varieties, inbred lines and hybrids introduced from the U.S.A. into Uruguay. A number of these appear to be well adapted to Uruguayan conditions.

923. Dimmock, F. 633.15–1.531.16(71)
The effects of immaturity and artificial drying upon the quality of seed corn.
Publ. Dep. Agric. Can. 1947 : No. 790 : Pp. 60. (also Tech. Bull. No. 58).

Comprehensive investigations on the effects of maturity and artificial drying on the quality of maize seed are reported.
Ears of maize were harvested at different stages of immaturity as indicated by the percentage moisture content, and either artificially dried at 108 ± 1·5° F. or air dried. The experiments are reported under the following headings: comparison between drying in a commercial bin drier and a Freas oven; kernel appearance; kernel weight, volume and specific gravity; inhibition of water; sprouting of plumule and radicle; seedling emergence; enzyme activity; kernel structure and composition; length of drying period; penetration and retention of heat; the effect of high temperatures upon germination and seedling emergence;

differential response of inbred lines to artificial drying; and differential response of single cross and double cross hybrids to artificial drying.
As a result of the investigations the drying of maize seed by heated air under a forced drought at a temperature of 108 ± 1·5° F. can be recommended as a reliable method of drying maize seed that has reached normal maturity, containing up to 35% moisture in the kernels at harvest. Drying the seed upon the ear to 14% moisture content or a slightly lower moisture content has no injurious effect upon germination, vigour and productivity; and such seed may be shelled and stored safely. Artificial drying at 108 ± 1·5° F. is injurious to immature seed in which the moisture content of the kernels exceeds 40% at harvesting, reducing the germination percentage, seedling vigour and productivity of the mature plant. Seed of inbred lines, and single cross and double cross hybrids derived from these inbred lines, when harvested in an immature condition with a kernel moisture content of 40% or more, and artificially dried at 108 ± 1·5° F. showed a differential response to the drying procedure. This result suggests the possibility of combining inbred lines whose seed is relatively unaffected by the drying process when immature to give hybrid seed that could be dried without appreciable adverse effect upon germination and vitality even when harvested in seasons unfavourable to seed maturity.

924. Jenkins, M. T. and
Elliott, C. 633.15–2.484–1.521.6(73)
***Helminthosporium turcicum* leaf blight ratings on corn at Plant Industry Station, Beltsville, Md 1945.**
U.S. Dep. Agric.; Agric. Res. Admin.; Bur. Pl. Indust. Soils Agric. Engin.; Pl. Indust. Sta. Beltsville, Md 1946 : Pp. 16. (Mimeographed).
A report is given of artificial inoculation tests of maize inbreds, single and double hybrids, open-pollinated varieties and foreign introductions for their reaction to *H. turcicum*.
In general, as in 1944, the earlier maturing inbred lines tended to be more susceptible than the later maturing lines. The Minnesota inbred line, A 71, however, was an outstanding exception to this general observation. This is the first early maturing line tested up to the present which appears to be highly resistant to *H. turcicum*. The late maturing inbreds (Ky 36–11)–1–3–1, (Ky 41–181)–1–1 and (Ky 41–175)–2–1, and the southern inbred GT 152 were rated as highly resistant in the year under review. Among the early single hybrids tested only Oh 51 A x Os 420 proved to be highly resistant. Eight of the late white single crosses were highly resistant, whereas none of the late yellow single crosses was rated as even moderately resistant. Late white single crosses involving CI 23 were rated as appreciably more resistant, with one exception, than the comparable combinations involving Mo 21 A. In the test of a group including two double crosses and eight open pollinated varieties the Peruvian variety Amarillo Coriente was outstanding for its high degree of resistance.

925. Patch, L. H. 633.15–2.7–1.521.6:578.08(77.2)
Manual infestation of dent corn to study resistance to European corn borer.
J. Econ. Ent. 1947 : **40** : 667–71.
Experiments are reported on the technique of manual infestation of dent maize with egg masses of the European corn borer. It was shown that the number of egg masses required for the satisfactory determination of resistance depends upon the growth of the plants at the time of infestation and the fertility of the soil.

926. Miles, S. R. 633.15.00.14:575.12(77.2)
Performance of corn hybrids in Indiana. 1937-1944.
Bull. Ind. Agric. Exp. Sta. 1946 : No. 511 : Pp. 53.
An account is given of performance tests carried out on maize hybrids at 16 different locations mostly in Indiana. Study of the available data indicates that the hybrids do not possess specific adaptation to certain soil types or soil conditions except in so far as these factors influence the growth period of the maize. Some superior hybrids to be tried out by farmers are described.

927. Glapp, A. L.,
Tatum, L. A.,
Heyne, E. G. and
Porter, C. R. 633.15.00.14:575.12(78.1)
Kansas corn tests, 1946.
Bull. Kans. Agric. Exp. Sta. 1947 : No. 333 : Pp. 48.

The results of performance tests carried out on maize in different disticts of Kansas in 1946 are presented together with a summary of results obtained during the last six years. The significance of the data is discussed.

BARLEY 633.16

928. 633.16:575(48.1)
Elle, T. 633.16.00.14(48.1)
Sortsforsøk med seksradsbygg 1926–42. (**Variety trials with 6-rowed barley 1926-42**).
Meld. Stat. Forsøksgård Møistad 1942 (1943) : H 57–79.
Meld. Stat. Forsøksstasjoner Plantekult 1942 (1944).
Tillegg H til Landbruksdirektorens årsmelding 1942.

The barley varieties, Maskin, Asplund, Vega, Jotun and Kjevik Stjerne, discussed in a 1935 communication, also took part in the present series of experiments, with, since 1938, four new varieties, Varde [Cairn], Bonus, Herse [Canton Chief] and 2/29–9–1 bred in Norway from the cross Asplund x Maskin.

Full details are given about the plan and execution of the experiments and about the performance, origin, and characteristics of the above mentioned varieties, including earliness and lodging.

Varde, released from Vidarshov Co-operative Seed Farm [Felleskjøpets Stamsaedavlsgård], was first described in 1940 by H. Wexelsen. In the present trials it averaged 58 kg. and 29 kg. per dekar more grain than Maskin and Asplund respectively; it has a relatively low yield of straw, but the straw is stiff; it is well adapted to the Oplandene district and ripens two days before Asplund, but two days later than Maskin; the grain is relatively large, as in Maskin, and the hectolitre weight high as in Asplund.

Herse, released in 1937 from the Voll Experiment Station and described by H. J. Eikeland, also surpassed both parents in yield of grain, Maskin by 48 kg. and Asplund by 19 kg. per dekar; it is from one to two days later than Varde, but resembles it in strength of straw and in quality of grain.

Bonus and 2/29–9–1, bred at the State Experiment Station at Forus and described by D. Linland in 1937, both did well though they averaged about 14 kg. per dekar less than Varde. Both have good stiff straw. The line 2/29–9–1 is earlier than Bonus and has a better quality of grain.

It is suggested that Varde should be used as widely as possible to replace Maskin, Asplund and Vega.

929. Hertzman, N. 633.16:575(48.5)
Weibulls Original Stallarkorn. (**Weibull's new Stallar barley**).
Weibulls Ill. Årsb. 1946 : **41** : 15–16.

In Sweden the area under barley, grown as a mixture, is double that under barley as the sole crop. Many of the new barleys are too short in the stem for mixed sowings. The new Stallar barley was bred to meet this lack. It is derived from the cross (Gull [Yellow] x a line from a land barley) x Maja and is thus a sister of Balder. It has long stiff straw, 15 cm. longer than that of Kenia and also considerably stiffer. It is about equal to Kenia in earliness, and, in various trials at Weibullsholm and in some official trials not yet completed, it has given a higher yield than Gull. The grain of Stallar is large, fine skinned and very plump, with a high hectolitre weight. Though primarily intended for fodder, Stallar has also features required in a good malting barley, e.g. stiff straw, early maturity as regards germination, high germination energy and high starch content or extract.
Brewery tests have confirmed its value for malting.

930. NILSSON-EHLE, H. 633.16:575(48.5)
Korn. (**Barley**).
Sverig. Utsädesfören. Tidskr. **1946** : **56** : **242–54.**

In this account of barley breeding in Sweden the special role of polymery in conditioning various characters is stressed, with reference to Nilsson's Ehle's work and the successful way in which this discovery has been utilized in the breeding of malting types, like Ymer, suitable for southern Sweden. Ymer could, it is believed, be further improved in regard to stiffness of straw; yield, by crossing with foreign barleys, e.g. varieties from Saxony and Bavaria; resistance to disease such as rusts, that occur under abnormal weather conditions, and to nematodes; and tolerance to increased nitrogen manuring, but with as low a natural protein content as possible, so that the malting quality is not impaired. Regional adaptation must also be taken into account, as is being done in the work of Holmgran at the Branch Station of the Swedish Seed Association at Kalmar where very promising new varieties have been obtained by hybridization with the Bavarian barley Isaria, though none have yet been put on the market.

The breeding of special barleys for use as fodder is discussed; requirements in this case are high yield, increased protein content, and the stiffest possible straw which must, however, also be long enough to allow of the variety being sown as a mixture with other crops.

The production of fodder barleys as a separate branch of plant breeding had already been begun with *nutans* barleys nearly 20 years ago at Svalöf and the Östgöta Branch Station. In crosses in 1935, between Maja and old Swedish land barleys, lines with relatively high protein content were used, including a line with very long but erect stiff straw, raised by Walstedt at Östgöta from Östgöta Flättring. From this line crossed with Maja, about 14,000 plants were raised of which 155 were selected for progeny tests and line selection. Such good results were obtained in 1943–45 after further selection that some of the lines according to Granhall compare well in yield and stiffness of straw with Maja and should soon be released to farmers.

Maja has also been crossed with land barleys from Gotland and Öland, but the results cannot be discussed yet. Further work on fodder barleys might include crosses between the best lines from the Flättring hybrids and Brage.

For the time being a moderate increase in hereditary protein content must suffice, but this can be compensated for by ensuring the greatest stiffness of straw possible and raising the protein content by manuring.

In view of the many and complex characters involved in breeding a good fodder type, an F_1 of from 50,000 to 10,000 plants is suggested as an initial basis for mass selection among the progeny for a series of years before line selection is applied. In this way more definite practical results might be obtained in a shorter time.

Breeding of a fodder barley of the dense eared, *erectum* type for humus rich soil has been in progress at the Ultuna station for some years.

Examples of progress in this group are Primus II, and selections from crosses between Primus and Opal or Kenia e.g. No. 37/55 (from Opal and Primus) which has surpassed Primus in yield, grain size, and stiffness of straw, and is also drought resistant.

Efforts are also being made to obtain an earlier type of Svanhals suited to even more northerly cultivation than is possible at present.

The requirements in six-rowed barleys for southern Sweden are increased yield and grain size, and resistance to nematodes and diseases. To breed the required type Brio, Asplund and six-rowed barleys from Denmark, Germany, etc., have been used as well as the two-rowed *nutans* and *erectum* barleys, Brage, Kenia and Primus. A series of Julia x Asplund crosses and others have resulted in high yields (in 1944 18% more than Brio), combined with stiffer straw, large grain and no reduction in earliness.

From crosses of six-rowed with two-rowed barleys, e.g. Braga, Kenia and Primus, some promising lines have been obtained which, after further selection or back crossing with some of the best six-rowed varieties, may prove of practical value.

Breeding with six-rowed barleys has been so successful that new varieties for southern Sweden will soon be released for sale. Equally successful results have been obtained in northern Sweden, as the varieties such as Vega, Dore, Stella and Edda show.

Crosses have also been begun with the object of rendering the variety Stella stiffer strawed

and higher yielding, while retaining its high industrial quality. Work is also proceeding at the Övre-Norrland Branch Station to increase still further the earliness of early varieties to obtain six-rowed types for upper and central Norrland where forms even earlier than Vega are needed.
The difficulties encountered in the breeding of winter barleys for Sweden and the various ways in which the problem has been attacked are outlined. The most promising and rapid method would appear to be breeding for transgressive forms from crosses between barleys of similar hardiness but from different parts of Europe. For this purpose Dutch (Mansholt) and Rumanian winter barleys have been chosen for crossing. The variety Bore has been produced in the course of this work.
The new prospects opened up by induction of mutations by irradiation are dealt with in another paper (cf. Abst. 687).

931. 633.16:575(71)
Titan, new barley strain expected to be ready for commercial seeding soon.
Canad. Grain J. 1947 : **3** : No. 3 : p. 11.
The Titan barley variety, developed at the University of Alberta, is to be commercially distributed in 1948 to farmers in Saskatchewan (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 715). It is more suited to combine harvesting than Prospect barley, and is reputed to be higher yielding and more resistant to drought and smut.

932. Wiebe, G. A. 633.16:575(73)
Improved varieties of barley.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 403–12.
Spring and winter barley selection and breeding carried out in the United States in recent years are surveyed, information being given on the most important varieties. The article includes a section on the barleys derived from composite crosses, such as Compana, Texan and Rojo.

933. D'Amato, D. and Gustafsson, Å. 633.16:575.243:581.04:537.531
Studies on the experimental control of the mutation process.
Hereditas, Lund 1948 : **34** : 181–92.
The mutational effects of chemical treatment of barley seeds followed by X-irradiation were investigated. The chemicals used in the experiments were different concentrations of colchicine, potassium cyanide, hydrogen peroxide, uranyl nitrate and ferric sulphate solutions, saturated butter-yellow solution, distilled water, and buffer solutions with pH values of 3 to 10. The significance of the results is discussed with reference to previous mutation studies and the possibility of ultimately controlling and directing the production of non-lethal mutations.

934. Hodjkov, L. E. 633.16:581.46:581.48:575
(The importance of the characters awn formation and husked grain in barley).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : p. 75.
Barley breeders are urged to direct their attention towards the production of a variety combining freedom from awns and naked grain with satisfactory yield.

935. 633.16:581.6(49.2)
Zevende jaarboekje van het Nationaal Comité voor Brouwgerst 1942.
[**Seventh yearbook of NaCoBrouw (National Committee for malting barley) 1942**].
Inst. Plantenvered. Wageningen Pp. 147.
This is an annual of general interest to all those concerned with barley and malting. It contains statistics of the 1940 harvest in Holland, for varieties and provinces, analyses of the samples, and details of the 1940 exhibition. In addition there are articles of a more popular nature, on an Egyptian beer vat, the value of barley straw for feeding, cultivation

and examination of malting barley in foreign countries, varieties of malting barley and practical hints on growing and storing barley for malting.
There are also statistics of the spring barley sown in 1941, for varieties and provinces; 51% of the total area was planted with Kenia, 20% with Goud (Golden), 14% with Mansholt's Two-rowed, 8% with Saxonia, 3% with Bigo, 2% with Zege, and 2% with other varieties. Yields obtained in experiments during 1932–41 are reported for Kenia, Mansholt's Two-rowed, Saxonia, Isaria, Goud, Spratt Archer, Bethges und Oelzes XIII, Lego Houbier's Four-rowed, J. v. P. 39/60 and P.B. C. B.

936. VEENBAAS, M. A. 633.16:581.6(49.2)
Verslag van een pel- en kwaliteitsonderzoek bij zomer- en wintergerstrassen in 1942. (**Research on pearling properties and quality of summer and winter barleys in 1942**).
Meded. Nat. Com. Brouwgerst 1946 : 165–93.

The qualities desired in barleys for pearling are described, together with the effect of various factors on the quality of the pearl barley produced. Notes are also given on the quality of various summer and winter barleys, and the influence of soil and other external factors thereon. The varieties dealt with are Kenia, Bethges und Oelzes XIII, Lago, Goud (Golden) I.v.P. 39/60, Mansholt's Two-rowed, Saxonia, Mahndorfer Victoria and Haïsa, as summer barleys, and Vindicat, Fletumer, Mahndorfer Victoria and Vogel's Agaer as winter crops.
Differences in the soil on which the crop was grown caused greater differences in the product than varietal differences. C. B.

937. DICKSON, A. D., OLSON, W. J. and SHANDS, H. L. 633.16:581.6:578.08
Amylase activity of three barley varieties as influenced by different malting conditions.
Cereal Chem. 1947 : **24** : 325–37.

A report is given of malting experiments on the Wisconsin Barbless, Wisconsin hybrid H35-7-2-1-3 and Peatland barleys, carried out under different conditions of moisture, temperature and time.

938. LINLAND, D. 633.16:581.6:581.46(48.9)
Ny 2r. byggsort. (**New 2-rowed barley variety**).
Norsk Landbruk 1944 : **10** : 43–44.

A description is given of the characteristics and performance of the barley varieties Opal B, Kenia and Maja in Denmark with observations on yields and lodging.
From the results, the writer concludes that a good two-rowed barley may equal the best six-rowed variety in yield and may have, in addition, grain of much better quality. A new 2-rowed barley 2r. Bj. 1/38 from a cross between a Bjørn mutant and a two-rowed derivative from an Asplund hybrid, is described. It has very large grain, the 1000 corn weight being 57·9 grm, and very stiff straw and ripens earlier than Opal B, Maja or Kenia. Its malting quality is to be tested.
The variety is being multiplied up and, when named, will be called Goliat [Goliath].

939. ERMOLENKO, A. I. 633.16–1.556:575.3
(**The question of the methods of purification of élite and super-élite seed of barley**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 47–48.

Barley ears were picked five different times at intervals of three days, starting with 26 June, and the grain was sown in 4 m^2. plots in 10 replications. All plots germinated at the same time as the control, but the plants from the seed picked on 26 June and 3 July were less attacked by *Helminthosporium* than those from seed picked on 8 July and produced slightly larger grains. It is concluded that earlier harvesting would be one of the ways of improving the quality of the seed.

940. FAVRET, E. A. 633.16–2.421.1:576.16:631.521.6:575.11(82)
Hallazgo de una nueva raza de "*Erysiphe graminis hordei*". (**Discovery of a new race of *E. g. hordei*).**
Rev. Invest. Agric. B. Aires 1947 : **1** : 237–40.

A new race of *E. graminis* var. *Hordei*, denominated Arg. 2, has been discovered. An account of its behaviour towards differential host varieties is given.
Hordeum spontaneum, Monte Cristo and Engledow India are immune to Arg. 2; Multau x Glabron extremely resistant; Nigrate, Gopal, Psaknon and Lion x Palmella very resistant; and *H. distichum* var. *nigrinudum*, Arlington Awnless, Importada Brügger and Duplex moderately resistant.
In the cross Monte Cristo x Trebi Sel. Klein, the immunity of the former variety was found to be inherited as a simple dominant, and to be determined by the same gene, Oi^{mc}, as conditions resistance to Arg. 1.

941. VALLEGA, J. and
FAVRET, E. A. 633.16–2.421.1:576.16:631.521.6:575.11(82)
Herencia de la resistencia a "*Erysiphe graminis hordei*" en cebada. I. Factores de resistencia en las variedades Monte Cristo y Nigrate. (**Inheritance of resistance to *E. g. hordei* in barley. I. Resistance factors in the varieties Monte Cristo and Nigrate**).
Rev. Invest. Agric. B. Aires 1947 : **1** : 81–91.

The variety Monte Cristo carries a dominant factor Oi^{mc} determining immunity to race Arg. 1 of *E. graminis* var *Hordei*. The variety Nigrate carries an incompletely recessive gene or^n determining resistance to the same race of *E. graminis*, and its effect is subject to the influence of at least one and possibly more modifying factors. The susceptible variety Trebi with which Monte Cristo and Nigrate were crossed, has the genetic constitution $oi^{mc}\ oi^{mc}\ Or^n\ Or^n$.

942. 633.16.00.14(49.2)
633.16:581.6(49.2)
Verslag van het brouwgerstrassen-proefveld te Barendrecht in het jaar 1944. (**Report of variety trials of malting barley at Barendrecht, 1944**).
Meded. Nat. Com. Brouwgerst 1945 : 89–162.

The erection of an experimental malting house, in which small samples of a few pounds of barley give reliable data on malting quality, has enabled the size of variety trial plots to be reduced from about 2½ acres to 100 square yards. The importance of being able to test 100 varieties in the area formerly required for one, and thus under practically identical conditions, is obvious in view of the number of promising varieties bred in recent years.
The present report gives data from 14 varieties (Kenia, Freya, Haisa, Abed Rigel, Balder, Stella Hylkema 619, Mansholt's Two-rowed x Zege, a Goud [Golden] selection, Svalöf 40–13, Svalöf 40–15, C.B. 364 C.3943, C.B. 364 B.3918 and Kenia x Montague) grown with four different levels of nitrogen manuring (roughly 20, 40, 60 and 80 lb. per acre). Yields of grain and straw, speed of covering the ground, thickness of foliage, earliness of ear emergence and ripening, and stiffness and length of straw, occurrence of various diseases and percentage of lodging are all estimated in the agricultural section.
In the section devoted to brewing analyses, moisture and protein contents, 1000 grain weights, grading on size, germination, and diastatic activity, as well as comprehensive analyses of the malts, are reported with full figures for each variety and level of nitrogen manuring.
Finally there is a statistical section in which the analysis of variance is fully explained, but the basic table is not given, but must be derived from two tables given in preceding sections. Increasing the amount of nitrogen applied to the crop resulted in an increase in yield of grain and of straw, but a decrease in the size of the grain.
It is concluded that Balder, Abed Rigel, Svalöf 40/15 and Stella (Hylkema 621) are as good as Kenia, both for the farmer and the brewer.
Brief descriptions of the new varieties and their performance are given. C. B.

943. GOMBERT, J. and ULENBERG, G. H. 633.16.00.14:581.6:578.08(49.2)
Beschrijving van een mouterij op laboratoriumschaal en het daarmede verrichte rassenonderzoek. (**Description of a laboratory malting plant and of the examination of varieties with it**).
Meded. Nat. Com. Brouwgerst 1943 : Pp. 16.

GOMBERT, J. and ULENBERG, G. H.
Het rassenonderzoek van brouwgerst in de proefmouterij. (**Examination of varieties of malting barley in the experimental malting plant**).
Ibid. 1943 : 18–24.

GOMBERT, J. and ULENBERG, G. H.
Het rassenonderzoek van brouwgerst in de proefmouterij—II. (**Examination of varieties of malting barley in the experimental malting plant—II**).
Ibid. 1944 : 74–86.

The first of these papers describes an experimental malting plant with which malting tests can be carried out on six 4 lb. samples simultaneously.
The second and third papers describe malting tests carried out on a number of varieties, using Kenia as a standard in 1942–3 and 1943–4. In the former year Kenia, Haisa and Peragis were classed as malting barleys, while in the latter tests Kenia, Haisa, Saxonia, Goud [Golden], and Spratt Archer qualified. In both papers barley and malt analyses are given for each sample.
The third paper includes a report on standard errors of the experimental plant and of nine maltsters using the same samples and draws attention to the impossibility of getting a reasonable comparison of varieties unless they are grown at the same place. C. B.

MILLETS AND SORGHUM 633.17

944. OSTROVSKIĬ, N. I. 633.171–2.7(47)
(**Attack of millet varieties by the millet midge and the method of assessing the damage**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 64–67.

All varieties of *Panicum miliaceum L.* tested proved susceptible to attack by the midge *Stenodiplosis panici* Rodd, whereas *Setaria italica* varieties remained entirely free.

945. 633.174(73)
What's new in farming.
Success. Fmg. 1947 : **45** : No. 10 : 18, 71.

A brief note is given on the new Axtell sorghum varieties due for certification in Nebraska in 1947. Axtell is a white-seeded forage type selected from Atlas sorghum by a Kansas farmer. It matures about one week earlier than Atlas. Up to the present, however, it has yielded slightly less forage but more grain than Atlas.

946. 633.174:576.312.32:576.354.4
GARBER, E. D. 633.174:576.312.315
The pachytene chromosomes of *Sorghum intrans*.
J. Hered. 1947 : **38** : 251–52.

The species *S. intrans* ($2n = 10$) occurs in Northern Australia, apparently restricted to the region around Port Darwin and Katherine. On account of the low chromosome number and unusual clarity with which the chromosomes can be seen at pachytene the species constitutes very favourable material for detailed studies of chromosome morphology. In each of the nine pollen mother cells examined from a single plant, two of the five chromosomes were associated with the single nucleolus. In the somatic nuclei one to four nucleoli were observed, nuclei with one or two nuclei occurring most frequently.

It is noted that the chromosomes of *S. intrans* are very different morphologically from the chromosomes of other species of *Sorghum* with the same diploid chromosome number.
In order to make full use of this species in cytogenetical investigations, it will be necessary to determine what environmental conditions are necessary to ensure seed set. When allowed to open-pollinate one plant set no seed and had 25% aborted pollen grains; from a second plant which was cross-pollinated six seeds were obtained from eight florets.

947. Quinby, J. R. and
Karper, R. E. 633.174:581.143.26.035.1(76.4)
The effect of short photoperiod on sorghum varieties and first generation hybrids.
J. Agric. Res. 1947 : **75** : 295–300.

Sorghum varieties and F_1 hybrids were subjected to 10-hour and normal photoperiods, both lots of plants being grown in midsummer plantings at Chillicothe, Texas. The experiments were carried out in 1941 and 1942. The varieties showed differences in their sensitivity to the 10-hour photoperiods, as indicated by head differentiation, first anthesis and the number of leaves on the mature plant. Most varieties, including the milo, kalo, hegari and feterita sorghums, California White durra, Bonar durra, Bonita, shallu and Freed were sensitive, whereas Blackhull kafir, Sumac, Bishop and Lemon Yellow formed a less sensitive group. The Manko sorghum was intermediate in sensitivity between these two groups. Dwarf broomcorn failed to respond to the 10-hour photoperiods in both years; Texas Blackhull kafir showed no response in 1942, the only year in which it was grown.
Distinction is drawn between photoperiodic sensitivity and the critical photoperiod. For example, Texas milo is a later maturing variety than Sooner milo, and the effect of the 10-hour photoperiodic treatment upon these varieties is to reduce the time of the first anthesis by approximately 20 and 6 days, respectively; this difference is considered to be due to the difference in the critical photoperiod and not to difference in sensitivity. Differences in photoperiodic sensitivity are exemplified by the behaviour of Sooner milo and Blackhull kafir.
The F_1 hybrids were sensitive to the 10-hour photoperiodic treatment, if one of the parents was sensitive. Hybrids showing relative insensitivity to short photoperiods were derived from relatively insensitive parent varieties. Sensitivity to short photoperiod is therefore a dominant character.

948. Karper, R. E. and
Quinby, J. R. 633.174–1.524(73)
Additional information concerning the introduction of milo into the United States.
J. Amer. Soc. Agron. 1947 : **39** : 937–38.

Additional information is given concerning the introduction of milo sorghum into the United States (cf. *Plant Breeding Abstracts*, Vol XVI, Abst. 1755).

949. Martin, J. H. 633.174–1.555:575(73)
Tailor-made sorghums.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 413–16.

An historical account is presented of breeding grain sorghum varieties in the United States suitable for combine harvesting.

RICE 633.18

950. 633.18:575(45)
Prove di orientamento di nuove varietà di riso in terreno torboso.
(**Preliminary tests of new rice varieties in peaty soil**).
Risicoltura 1941 : **31** : p. 90.

Data are given regarding the date of ripening, plant height, and yield for the principal varieties recently produced by the Rice Research Station at Vercelli. The varieties Stirpe 136, Originario, Balilla and Agostano were amongst those classed as the most successful.

951. CHIAPPELLI, R. 633.18:575(45)
Relazione sul concorso selezione sementi riso 1940. (**Report on the selected rice seed competition in 1940**).
Risicoltura 1940 : **30** : 285–94.
The results of the 1940 selected rice seed competitions showed Americano 1600 to be the most popular variety still; some of the newer varieties produced by the Rice Research Station at Vercelli are increasing in popularity, notably strain 136 (cf. Abst. 953) for which the demand was greater than the supply of seed. Some of the varieties produced by the growers are also proving promising.

952. CHIAPPELLI, R. 633.18:575(45)
La selezione del riso. (**Rice selection**).
Risicoltura 1940 : **30** : 170–72.
Since the inception of the Rice Research Station at Vercelli the average yield of rice in north Italy has risen from 30 c. per ha. to 50 c., largely as a result of the production of improved varieties by the Station and the selection carried out by the cultivators under the guidance and encouragement of the Station. Brief instructions are given for growers wishing to effect this selection.

953. CHIAPPELLI, R. 633.18:575(45)
Le nuove varietà di riso. Varietà "Stirpe 136". (**The new rice varieties. The variety Strain 136**).
Risicoltura 1940 : **30** : 249–53.
Strain 136 is a selection from a cross of Lady Wright x Chinese Ostiglia and combines the standing capacity and transparent grain of the former parent with the freedom from shedding and freedom from awns of the latter. It is vigorous in growth and 10 days earlier than Americano 1600, which enables it to replace the variety Maratelli (cf. Abst. 958). Owing to its resistance to shedding it suffers very much less damage from hail than other varieties. A number of letters from cultivators testifying to this and its other merits are cited.

954. CHIAPPELLI, R. 633.18:575(45)
Le nuove varietà di riso. "Senatore Novelli" e "Precoce Sesia". (**The new rice varieties. Senator Novelli and Precoce Sesia**).
Risicoltura 1941 : **31** : 6–10.
Both the varieties described arose by natural hybridization. They have large grains of the finest Carolina type, of good cooking quality and flavour. The plants are extremely resistant to lodging and also to brusone and collar rot (mal del collo). Precoce Sesia has given yields higher than any so far obtained from fine or semi-fine varieties, and although they are somewhat lower than those from Americano 1600, the earlier maturity and the higher value of the product more than compensate for the difference.

955. PIACCO, R. 633.18:575(45)
La tecnica della selezione del riso. (**The technique of rice selection**).
Quad. Staz. Sper. Risic., Vercelli 1941 : No. 21 : Pp. 118.
This manual on rice breeding is designed to give full instructions to cultivators concerning the methods of maintaining pure stocks, of improving the quality of existing varieties by selection and of creating new and improved varieties of rice.
The work begins with an historical account of the rice varieties grown in Italy and of the efforts made to improve them, firstly by acclimatization, then by the campaign started in 1903 by Novelli to encourage the cultivators to carry out their own work of mass selection, and later by the breeding work of the Vercelli rice research station, founded in 1908.
The desiderata in respect of rice varieties for Italy are discussed. The first is time of maturity: for instance, varieties that tolerate late sowing without undue loss in yield have still to be produced. Next comes yield: an average yield of 50–60 quintals per ha. is the minimum acceptable in ordinary varieties, with peak yields of 90–100 quintals in extremely favourable conditions. Lodging resistance is the next desideratum, followed by resistance to disease and to shedding, low stature, awnlessness, length of grain, the minimum being 7 mm., and finally grain consistency and husk percentage and colour, white forms being preferred.

A botanical description of the rice plant and its various organs is given, with excellent illustrations. There follow full indications of the various impurities from which the rice must be freed when carrying out mass selection and of the different characters to select for at the different periods of vegetation. Since many of the Italian rice cultivators carry out quite intensive breeding work, notes are included on acclimatization, individual plant selection and hybridization, with notes on how to apply them; even a succinct account of the Mendelian laws is provided. Finally, a definite example is described, in the form of a cross between the two varieties Nano and Nanetto; data are given on characters such as time of maturity, height, tillering, colour, stem diameter and size of panicle and spikelet for the parent generation, the F_1, F_2 and F_3. Although both parents were dwarf the progeny were all of normal stature.
Final chapters deal briefly with the methods of carrying out variety tests and the botanical and agricultural classification of rice varieties.

956. Piacco, R. 633.18:575(45)
Le nuove varietà di riso. La varietà "N. 13". (**The new rice varieties. The variety N.13**).
Risicoltura 1941 : **31** : 37–40.
The variety described is a product of selection from a natural hybrid and is 15 days earlier in maturity than Americano, being classed as mid-early. It is free from the main diseases and the grain is larger than that of the common varieties such as Originario, Americano and Balilla, though smaller than that of P.6. Data from yield tests are given which show that N.13 has yielded better than Americano, Balilla and other older varieties.

957. Piacco, R. 633.18:575(45)
Il problema delle varietà di riso. (**The problem of varieties of rice**).
Risicoltura 1941 : **31** : 176–81.
The reasons which make continuous breeding work necessary, in spite of the excellence of the rice varieties already existing in Italy, are discussed. They comprise degeneration of varieties, improved conditions of farming, the great variety of conditions under which rice is grown, shortage of irrigation water, and the need to produce varieties with large elongated grain suitable for export.
The various methods employed in effecting the required improvements are discussed under the headings: acclimatization, pure line selection, hybridization and other treatments.

958. Sampietro, G. 633.18:575(45)
L' "Allorio", il "Maratelli" e il "Precoce 6" invecchiano: altri risi possono sostituirli! (**Allorio, Maratelli and Precoce 6 are getting old: other rice varieties can replace them**).
Risicoltura 1940 : **30** : 225–33.
The rice variety Allorio has suffered from lodging, Maratelli and Precoce 6 [Early 6] from collar rot (mal del collo). The last named variety has also deteriorated in type.
The cultivation of these varieties should therefore be discontinued and descriptions are given of certain newer varieties recommended to replace them. The first is Greggio, a selection from a cross of Nano and Lady Wright made in 1947. It is a main season variety, maturing in north Italy in 165 days; although it is tall it is resistant to lodging; its grain is semi-fine, larger than Allorio and in every respect superior to Precoce 6; its yield in experimental plots has been 60 c. per ha., which approaches that of the old high yielding varieties. Reports of several growers are reproduced, showing that the variety has done well in cultivation and yielded grain of good cooking capacity, even on rather mediocre soils, though it is somewhat prone to attack by blast disease.

959. De Vecchi, E. 633.18:575(45)
Su l'origine del "Nero di Vialone". (**The origin of the variety Nero di Vialone**).
Risicoltura 1940 : **30** : 242–43.
A letter from the originator of this rice variety is reproduced, in which he describes the discovery of a plant with violet, almost black, grain in a field of the white grained variety

Lencino in 1898. From the progeny a new variety was selected and having gained a succession of prizes from 1903 onwards was given the name Nero di Vialone and released for sale in 1905.

960. Jones, J. W. 633.18:575(73)
New rices; new practices.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 373–78.
The article includes a brief historical account of rice varieties developed in the United States.

961. Chiappelli, R. 633.18:575:581.48(45)
Nuove varietà di riso al campo sperimentale. La stirpe 537. (**New rice varieties at the experimental field. Strain 537**).
Risicoltura 1941 : **31** : 211–14.
Strain 537 is derived from a promising plant found in the third generation of a natural hybrid between Lady Wright and Nero Vialone. In stature it is a little lower than Americano 1600, varying between 72 and 92 cm.; it is resistant both to diseases and to lodging, and its grains are extremely long and broad, with a 1000 grain weight of 54 grm. as compared with 29–30 grm. for Americano 1600. It gives a 60% yield of polished rice and is regarded as an extremely promising variety in the "very fine" class.

962. Hedayetulla, S. and
Sen, S. 633.18:575.247
Bud mutation in paddy.
Sci. and Cult. 1946 : **12** : p. 53.
Plants with two distinct kinds of tillers, differing in colour and size, were found among the progeny of a dwarf mutant rice plant. The abnormalities were due to early bud mutations.

963. Novelli, N. 633.18:575.42(45)
La selezione delle sementi di riso. (**Seed selection in rice**).
Risicoltura 1940 : **30** : 121–26.
The annual prizes for the best quality seed, combined with the breeding work at the Vercelli rice breeding station, have led to an increase in the purity of Italian rice seed from 80% in 1911 to almost 99% in 1940 and at the same time improved the characteristics of the varieties grown.

964. Piacco, R. 633.18:575.42(45)
La sezione dei selezionatori. Il nuovo concorso selezione sementi riso. (**The section of selectionists. The new competition for rice seed selection**).
Risicoltura 1940 : **30** : 168–69.
In future, competitors will not receive prizes but certificates indicating the quality of their seed, the classes being excellent, good, fair and satisfactory. A certain number of prizes will be given to new competitors.

965. 633.18:575.42(45)
Piacco, R. 633.18(45)
La selezione dei risi in campo. (**Field selection of rice**).
Risicoltura 1941 : **31** : 128–30.

Piacco, R.
Caratteri guida per la selezione di massa dei risi. (**Character guide for mass selection in rice**).
Ibid. 1941 : **31** : 145–54.
Instructions are given to would-be competitors in the national Italian rice competitions for carrying out selection in the field, eliminating weeds, wild rice, forms with red grain, off-types, other varieties, natural hybrids, etc. The most important characters to be studied

in doing this at the various development stages, and certain special characteristics of particular varieties that make them early recognizable are mentioned.

966. CHIAPPELLI, R. 633.18:581.48:578.08(45)
La selezione del riso e le varietà a cariosside rossa. (**Rice selection and the varieties with red grain**).
Risicoltura 1941 : **31** : 255–56.
Certain varieties with red grains are in other respects so similar to some white grained varieties that their separation is extremely difficult. By the use of a diaphanoscope with a green glass in place of the usual colourless glass a most effective separation can be achieved.

967. HEDAYETULLAH, S. 633.18:582:575(54.1)
Improved paddy in Bengal.
Sci. and Cult. 1946 : **11** : 524–31.
The systematics, origin, history of cultivation and multiplicity of varieties of rice are discussed. The Bengal varieties belong to five different physiological and agricultural groups. The differences between some varieties are almost entirely physiological ones. The kinds of morphological distinctions which are met with are enumerated.
The problem of the production of improved varieties for Bengal is discussed. The low average yield in the region is attributed to the growing of mixtures of varieties not particularly well adapted to the local conditions. It could be remedied by breeding improved seed, the introduction of new varieties and the adoption of improved cultural practices. Rice breeding work is in progress at four stations in Bengal. Reference is made to improved strains produced as a result of 30 years' research.

968. DARLINGTON, C. D. and CHATTERJEE, D. 633.18:582:576.312.35
Wild and cultivated rice.
Nature, Lond. 1947 : **160** : 756–57.
Chatterjee's article on the systematics of rice (cf. Abst. 228) is criticized by Darlington on the grounds that important cytological information is omitted, that *Oryza Eichingeri* was not plotted in East Africa on the map, that unacknowledged quotations are included, and that the sources used are not wisely chosen.
In replying to these criticisms, Chatterjee points out that information on the cytology and chromosomes numbers of the species of *Oryza* was outside the scope of the article, which was meant to deal only with a particular part of the problem and should be judged on its own merits. Peake's book from which material was used was acknowledged at the end by being included in the list of reference books. The omission to plot *O. Eichingeri* in East Africa was accidental and will be corrected in a fuller paper.

969. PIACCO, R. 633.18–2.183–1.521.6(45)
Una nuova varietà: l' "Inalettabile 16". (**A new variety, Inalettabile 16**).
Risicoltura 1941 : **31** : 194–96.
The rice variety Inalettabile 16 [Non-lodging 16] is very short in stature, from 90 to 100 cm., and is distinguished by unusual standing capacity, good yield and grain of the common, Americano, type.
It ripens 15 days before Americano 1600. It is a selection from the Japanese variety Norin 1, introduced in 1937.

970. GANGULY, D. 633.18.00.14–2.484–1.521.6(54)
***Helminthosporium* disease of paddy in Bengal.**
Sci. and Cult. 1946 : **12** : 220–23.
It is reported that, of 44 varieties of rice tested during 1946 in Bengal, Dahar Nagra 273–32, Patnai 549–33, Patnai 23, Kalma 219 and Nagra 41–14 proved the most resistant to *H. Oryzae* and Kalamkati 147 and Bhasakalma the most susceptible. A detailed account of varietal resistance will be published later.

971. ALBERTS, H. W. 633.19(8)
Quinoa—ancient food crop in South America.
Agric. Amer. 1947 : **7** : 150–52.

An account is given of quinoa (*Chenopodium Quinoa*), a cereal food cultivated in South America. It is mentioned that over a 100 varieties are known. A few varieties have been selected as the most productive; the most popular variety is known as Blanca Real. It has a large flattened grain, the skin of which is said to be less bitter than that of most other varieties. It is also stated that *Ch. pallidicaule* and *Amaranthus caudatus*, which also grow in South America and are similar to quinoa, might be used as sources of food.

FORAGE GRASSES 633.2

972. FRÖIER, K. and 633.2:575(48.5)
JULÉN, G. 633.3:575(48.5)
Slåtter- och betesvallväxter. (**Meadow and pasture plants**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 280–89.

The breeding of herbage plants at Svalöf has been conducted on various lines: (1) selection within local strains, imported strains and wild Swedish or foreign material; (2) hybridization; (3) inbreeding; (4) chromosome doubling; and (5) the induction of mutants by X-irradiation. Of these methods breeding by selection has been the most successful, partly owing to the lack of information about the theoretical basis of inbreeding effects and the stimulation that results from crossing, although these phenomena have been intensively studied since 1900.

The present paper gives a survey of the results that have been obtained by selection and acclimatization and by the other four methods mentioned above.

In addition to the actual breeding of herbage plants, much fruitful research has been carried out by the Swedish Seed Association in co-operation with various other bodies on fertilization in red clover, mixtures of herbage plants, combined variety and manuring trials, and the production of lucerne seed.

973. 633.2:575(73)
HEIN, M. A. 633.2–1.524(73)
Grasses for hay and pasture.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 417–26.

A survey is given of introduced grass species and achievements in grass improvement by selection and breeding in the United States.

974. 633.2:576.16:575"793"(41)
Scottish Plant-Breeding Station.
Trans. Highl. Agric. Soc. Scot. 1947 : **59** : 92–94.

Recent investigations in herbage crop development carried out by the Scottish Plant-Breeding Station are discussed. Experiments dealing with the complementary utilization of cultivated and rough hill grazings were resumed in 1943. The principal aim of these investigations is to supply livestock on nutrient-deficient rough grazings with a balanced diet by the supplementary feed provided by cultivated herbage rich in protein. It appears that the pure culture pasture is more satisfactory for this purpose than the customary mixed sward. Experimental work is therefore being directed towards the development of suitable maturity races which will give a succession of protein-rich herbage. Field trials have shown that perennial ryegrass is a particularly suitable species for complementary purposes, at least in areas of heavy rainfall. It is however possible that short-lived grass such as Italian ryegrass and its hybrids may be more suitable in certain circumstances. Several races of mid-season and late perennial ryegrass capable of withstanding heavy treading have proved satisfactory, but so far no early race of the desired type has been secured. A survey of regional populations is being continued with the aim of finding such a race; the variations shown by local populations within a given region is receiving considerable attention. The breeding potentialities of collected material are also under investigation.

975. FELFÖLDY, L. 633.2:576.356.5:581.45(43.91)
Néhány hazai füfajta természetes polyploid alakja. (**Natural polyploid races of certain Hungarian grasses**).
Rep. Hung. Agric. Exp. Sta. 1947 : **47** : 11–16.

Chromosome counts were made of certain grasses found on the Tihany peninsula of Lake Balaton. The paper contains data relating to grasses of which polyploid races were found. The following polyploid races are recorded: *Agrostis stolonifera*, L., $2n = 28$; *Agrostis gigantea* Roth., $2n = 42$; *Poa pratensis* L., s.l. $2n = 35$, 42 and 49; *Festuca pseudovina* (Hack) Nym., $2n = 28$; *Festuca valesiaca* Schleich., $2n = 28$; *Festuca sulcata* (Hack) Nym., $2n = 42$; and a *Festuca* hybrid, $2n = 35$.
The thickness of the leaves and its standard deviation were measured and the figures are given in the paper.
The author points out that his aim is to compare the natural and induced polyploids of certain grasses and to assess the value of the natural polyploids as parents in crosses with artificially produced varieties. T. P. B.

976. 633.2:581.192
JULÉN, G. 633.31/36:581.192
Redogörelse för undersökningar över växttråd-, råprotein- och karotin halter i vallväxter och andra grönfoderväxter vid Svalöf 1945. (**Investigations on the content of crude fibre, crude protein and carotene in herbage plants and other green fodder crops at Svalöf 1945**).
Nord. JordbrForskn. 1947 : Nos 1–2 : 131–58.

Two series of experiments are recorded, one with blue lucerne, red and white clover, timothy, meadow fescue, perennial rye grass, smooth stalked meadow grass, and red fescue, and a second with, in addition, oats, peas, vetches, and blue bitter and yellow sweet lupins. The chemical composition was affected by the time of harvesting and by the stage of development.

977. BEETLE, A. A. 633.2:581.9(79.4)
Distribution of the native grasses of California.
Hilgardia 1947 : **17** : 309–57.

The distribution and habitats of native Californian grasses are described. The information provided should prove valuable in range management and grass selection in California. The paper includes 184 distribution maps.

978. PARODI, L. R. 633.2:582:576.312.35(82)
Gramíneas bonarienses. (**Grasses of Buenos Aires**).
Centro Estudiantes Agron. B. Aires 1946 : Pp. 112.

A key is presented for determining the genera of the grasses in the Province of Buenos Aires, Argentina. A representative species of each genus is figured. The species themselves are listed, and chromosome numbers are given when known.

979. HÅKANSSON, A. 633.21:576.356.4
Embryology of *Poa alpina* plants with accessory chromosomes.
Hereditas, Lund 1948 : **34** : 233–47.

The behaviour of the accessory chromosomes of *P. alpina* during meiosis in the ovules, in cell divisions in the developing endosperm and embryo after fertilization, and in the primary roots of nearly mature embryos and germinated seeds is described and discussed. At diakinesis and first metaphase in the ovules, the accessory Y chromosomes form bivalents or remain unpaired. They are not eliminated at meiosis as unpaired A chromosomes are. There is evidence that they are heterochromatic and that their centromeres differ from those of the A chromosomes. Little evidence of the elimination of accessory Y chromosomes was obtained except in the primary roots of some mature embryos. No mitotic process was observed to account for the fact that there is usually an even number of accessory chromosomes. The condition of the centromere and heterochromatin of the accessory chromosomes is compared with the corresponding data reported for other grasses.

980. LANTZ, H. L. 633.23:575(73)
Bent grass trials in Iowa.
Trans. Ia Hort Soc. 1945 : **80** : 172–76.
Trials of bent grass strains have been carried out in Iowa as part of the investigations carried out by the United States Greenkeepers' Association to improve turf. The strains have shown marked differences in various characteristics. The possibilities of breeding strains showing still further improvements are discussed.

981. HURCOMBE, R. 633.261:582:576.312.35
A cytological and morphological study of cultivated *Cynodon* species.
J. S. Afr. Bot. 1947 : **13** : 107–16.
Morphological, anatomical and cytological investigations were carried out on the following *Cynodon* grasses with a view to elucidating their taxonomical relationships: coarse kweek (*C. dactylon* Pers.), Florida (*C. transvaalensis* Burtt Davy), Bradley (*Cynodon Bradleyi* Stent), Magennis, and Hall's Selection. The first three named are recognized species. Magennis was found to be a hybrid between *Cynodon dactylon* and *C. transvaalensis*. Since the hybrid reproduces vegetatively and thus remains true to type, it is referred to as *C. Magennisii* sp. nov. Hall's Selection was found to be a variety of *C. dactylon*, and is described under the name *C. dactylon* Pers. var. *densus*, reference being made to its compact habit of growth.
The species do not differ greatly in their external morphological characters. The only characters found to be reliable as a basis for distinguishing the species are the vernation of the leaves, the presence or absence of rhizomes, the nature of the rachilla when produced, and the length of the glumes in relation to that of the spikelet. As regards the anatomy of the leaf it was found that the nature of the abaxial epidermis and the number of the first order vascular bundles formed satisfactory diagnostic characters. An identification key to the *Cynodon* species and varieties studied is given, based upon anatomical and morphological features.
The following chromosome numbers are reported: *C. Bradleyi*, $2n = 18$; *C. transvaalensis*, $2n = 20$; *C. dactylon* and *C. dactylon* var. *densus*, $2n = 40$; and *C. Magennisii*, $2n = 30$. The results suggest that the basic number of the genus is $x = 10$. *C. Bradleyi* is assumed to be an aneuploid species; its complete sterility suggests that it has a hybrid origin.

982. LAW, A. G. and
SCHWENDIMAN, J. L. 633.262:575.42(79.7)
Bromar mountain bromegrass.
Bull. Wash. St. Agric. Exp. Sta. 1946 : No. 479 : Pp. 11.
The improved Bromar strain of mountain brome is described (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1045).

983. STEBBINS, G. L. (JUN.) 633.262:576.16:575.129
The origin of the complex of *Bromus carinatus* and its phytogeographic implications.
Contr. Gray Herb. Harv. Univ. 1947 : No. 165 : 42–55.
It is suggested that the octoploid grasses of the *B. carinatus* complex arose through hybridization between hexaploid grasses of section *Ceratochloa* of *Bromus* and diploid representatives of section *Bromopsis* of the same genus. A similar but independent origin is postulated for the South American species complex represented by *B. pitensis*.
No hexaploid representatives of section *Ceratochloa* are extant today in North America although they are to be found in South America. It is suggested however that they were present in North America in the mid or late Tertiary Period, and that they may have been exterminated either by the Pleistocene glaciation or by competition with the vigorous octoploids.

984. MURRAY, J. 633.264–1.524:576.16(71)
Creeping red fescue. (*Festuca rubra genuina*).
Circ. Dep. Agric. Alberta 1946 : No. 7 : Pp. 12.
The strain of *F. rubra* var. *genuina* grown in Alberta was introduced from Europe in 1931; since its introduction the strain has been further selected at the School of Agriculture, Olds.

During the last decade seed has been distributed to many localities in the prairie provinces and to a limited extent in eastern Canada and the United States.
The circular gives information on the general characteristics of the strain, its adaptation, uses as a hay crop and pasture, palatability, and seed production and germination.

985. 633.283:582(69.1)
633.288:582(69.1)
633.289:582(69.1)
CAMUS, A.
Graminées nouvelles de Madagascar. (**New Gramineae from Madagascar**).
Bull. Soc. Bot. Fr. 1947 : **94** : 39–42.
Six new grasses from Madagascar are described: *Panicum calcicolum, P. muscicolum, Brachiaria Hubbardii, Isachne muscicola, Eragrostis Humbertii* and *Nastus Decaryanus.*

986. PARODI, L. R. 633.283:582(81)
Nuevo género de gramíneas del Brasil. (**A new genus of Brazilian grasses**).
Bol. Soc. Argent. Bot. La Plata 1946 : **1** : 293–97.
A description is given of a new Brazilian grass species, *Thrasyopsis Rawitscheri.* The genus *Thrasyopsis,* also new, is included in the Paniceae.

987. PARODI, L. R. 633.285:582
Las especies de gramíneas del género "Nassella" de la Argentina y Chile. (**The grass species of the genus *Nassella* in Argentina and Chile**).
Darwiniana, B. Aires 1947 : **7** : 369–95.
In this description of the Argentine and Chilean species of *Nassella,* one new species is described, *N. Johnstonii.*

988. SCHWENDIMAN, J. L. and
LAW, A. G. 633.289:575.42(79.7)
Primar : A new slender wheatgrass for conservation use.
Bull. Wash. St. Agric. Exp. Sta. 1946 : No. 478 : Pp. 16.
The new Primar strain of slender wheat grass is described (cf. *Plant Breeding Abstracts,* Vol. XVII, Abst. 1045).

989. CAMUS, A. 633.289:582(69.1)
Decaryochloa, genre nouveau de graminées malgaches. (***Decaryochloa,* a new genus of the Gramineae from Madagascar**).
Bull. Soc. Bot. Fr. 1946 : **93** : 242–45.
A new bamboo from Madagascar, *D. diadelpha,* is described.

LEGUMINOUS FORAGE PLANTS 633.3

990. MCKEE, R. 633.3(73)
New legumes for the South.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 439–42.
Recent developments in the use of new crops and new varieties of previously cultivated crops in the southern states are surveyed. Reference is made to the following: Early Korean and Climax lespedeza; strains of Austrian Winter field pea with improved disease resistance; *Crotalaria*; blue and yellow lupin; hairy indigo; big trefoil and big-flower vetch, both of European origin; rough pea; and Dixie crimson clover.

991. TYSDAL, H. M. 633.31:575(73)
Breeding better alfalfa.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 433–38.
Breeding work resulting in the development of Atlantic lucerne, the bacterial wilt resistant Ranger and Buffalo varieties, and the nematode resistant Nemastan is reviewed; and the possible value of hybrid and synthetic lucerne is discussed with reference to recent experiments.

992. Tomé, G. A. 633.31:575(82)
El mejoramiento de la alfalfa. (**The improvement of lucerne**).
Rev. Argent. Agron. **1947** : **14** : 279–313.

An extended review is given of Argentine lucerne breeding. The objectives are high yield, longevity, nutritive value, disease resistance, seed productivity and adaptability.
The following breeding methods have been utilized: the collection of ecotypes; mass selection, which has given rise to nematode resistant forms; line selection; hybridization, the production of heterotic hybrids, in which connexion seven lines of high combining ability have been isolated; the production of synthetic varieties; and induction of polyploidy.

993. Hollowell, E. A. 633.32(73)
More and better clover.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 427–32.

The following clover varieties are described: Midland and Cumberland red clover; Ladino white clover; Evergreen, Madrid, Spanish, Williamette and Sangamon sweet clover; Dixie crimson clover; and Tallarook and Mount Barker subterranean clover.

994. Fisher, R. A. 633.32:581.162.5:575.11
Number of self-sterility alleles.
Nature, Lond. **1947** : **160** : 797–98.

The author agrees with the estimate given by Bateman, in a note on the *S* allelomorphs in two clover varieties (cf. Abst. 261) for the total number of allelomorphs in each variety, but considers that the 5% upper limit added by Bateman is not justified by the data.

995. Schwanbom, N. 633.322:575(48.5)
Weibulls Original Nora Vitklöver (W : s V. 322) (**A new variety of white clover, W: s Nora**).
Agri Hortique Genetica, Landskrona **1947** : **5** : 10–15.

This new clover strain, released to the market by the Weibullsholm Plant Breeding Institute in spring 1947, was obtained by repeated selection from a Norwegian white clover strain from the Hamar district. It has equalled the Morsö-Lönhult clover, a Weibull commercial variety, in yield and has surpassed it in drought resistance, and possibly also in persistence. In the severe drought of 1947 Nora gave a better yield than Svalöfs Hero in the first and second year ley.
Nora is a useful supplement to Weibull's Robusta white clover which combines a special high yield with resistance to drought, but does not spread very well. Nora flowers about as abundantly as Morsö-Lönhult which it also equals, on the whole, in number of flowers per head.
About 56% of the leaves lack the light coloured marking of white clover.

996. Elliott, H. G. and
Gardiner, C. A. 633.326(94.1)
"Yarloop" (White Seeded) subterranean clover (*Trifolium subterranean*).
J. Agric. W. Aust. **1947** : **24** : 228–31.

The Yarloop subterranean clover is described, which became an important commercial clover in south-western Australia about eight years ago. It is also known as the Albine or White Seeded clover. It is believed that the variety originated in the vicinity of the Yarloop-Cookernup area of Western Australia. Yarloop is an early flowering, rapidly growing type. It appears to be widely adaptable, but does best on the water-logged, heavy clay lands of the coastal plain.

997. 633.35:575(48.5)
Åkerberg, E. and 633.378:575(48.5)
Bingefors, S. 635.65:575(48.5)
Baljväxter. (**Legumes**).
Sverig. Utsädesfören. Tidskr. **1946** : **56** : 309–13.

This paper deals with legume cultivation during 1936–46 and legume breeding before 1936 and subsequently. The manifold aims in breeding culinary peas, fodder peas, vetches,

field beans and brown beans are shortly set out, and the redistribution of research on legumes since 1934 among the Ultuna and other branch stations and the main institute of the Swedish Seed Association is mentioned.

The wide range of problems studied in the breeding of culinary peas include: cooking quality, regional adaptation to drought conditions by the production of later types, straw stiffness, earliness, rapid termination of the flowering period so that attack by *Contarinia Pisi* is avoided, and the improvement of quality and flavour by crossing marrowfat and snap marrowfat peas.

The new culinary pea 03023, derived from the Holgersson pea, was given over to the Seed Co. [Utsädesbolaget] in 1945. It has proved high yielding in all the pea growing parts of southern and central Sweden, and its cooking quality is good.

The requirements regarding fodder peas are equally varied and much attention is given to the breeding of types suited to different regions. Other objectives are: high yield of seed and of green forage, since many varieties are used for both purposes; suitability as regards time of maturity and habit for growing in mixtures with cereals; high protein content; large and small seeded types; pronounced earliness, particularly of grey peas for Norrland; for districts where *C. Pisi* occurs, earliness combined with rapid termination of flowering; a late grey pea with a high yield of green forage, for seed production to replace the imported fodder peas.

Problems common to the production of cooking and fodder types have also been studied, e.g. the best rate of seeding for different varieties, the development of field peas less prone to shedding, and varietal observations on the frequency of *Laspeyresia* damage and its incidence in different localities.

In vetch breeding the primary aim is better varieties of the same types as the improved sweet vetches and grey vetches. Hybridization with foreign varieties is being carried out to obtain earlier and more uniform ripening, and crosses with white seeded types are being made to improve the seed quality, the white vetches being comparatively free from bitter principles. Some land varieties from Östergötland and Västergötland have proved high yielding and are therefore being tested and undergoing line selection at the branch stations in both places.

At Ultuna and Svalöf much work is being done on field beans to obtain a small seeded variety. Other objectives are increased earliness, stiff stems and high yields. Line selection in some populations has produced some lines with very small seeds and these lines have been intercrossed and also crossed with some small seeded English varieties. Mixtures of field beans, vetches and oats are being tested in supplementary trials.

Foreign and Swedish varieties of brown beans are undergoing comparative trials at Svalöf and Ultuna, and selection in some land varieties and mixed commercial varieties is proceeding.

998. Haan, H. de 633.35:575(49.2)
Registration of new crop plants.
Farming, London 1947 : **1** : 334–35.

An account is given of the comprehensive scheme for the registration of new crop varieties in the Netherlands. The first Dutch Descriptive List of Varieties of Field Crops was issued in 1924.

999. McKee, R. and
Ritchey, G. E. 633.367(73)
Lupins: new legumes for the South.
Fmrs' Bull. U.S. Dep. Agric. 1947 : No. 1946 : Pp. 10.

This is a useful bulletin giving concise information on the uses of lupin species, the distinction between alkaloid and non-alkaloid strains, adaptation, seed characteristics, feeding values, cultural requirements and other topics.

1000. Tedin, O. and
Josefsson, A. 633.367:575.12:581.6(48.5)
Lupiner. (**Lupins**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 314–15.

This note supplements Josefsson's survey (cf. *Plant Breeding Abstracts*, Vol. XV, Absts 252

and 1039) of the work done in Sweden on sweet blue and yellow lupins. Increased earliness, reduced alkaloid content and absence of premature dehiscence of the pods are still important aims in breeding, as well as good and reliable yields.
X-irradiation of yellow sweet lupin has induced mutations but whether mutants for earliness, the character desired, will be obtained is not yet known.
Work on the breeding of blue sweet lupins is proving difficult.
In 1946, some early ripening plants of bitter blue lupin were discovered left over in a field in which blue lupins had been grown as a green manure. Crosses between these early lupins and the original sweet lupin have resulted in valuable new varieties of blue sweet lupin, one of which, 01501, is being multiplied up by the Seed Co. The original sweet lupin has been lost and no more could be obtained, but the above new varieties have been tested with yellow sweet lupin at Ugerup and at Flahult. The results have not shown clearly under what conditions the blue or yellow sweet lupin is to be preferred, but the blue was not clearly inferior to the yellow in any of these trials, whether harvested for green ensilage or as a ripe crop. Its earliness would however appear to offer certain advantages over the yellow, and it should also be a reliable crop in whatever districts it could replace the yellow lupins now grown.

1001. Troll, H.-J. 633.367:581.143.26.03(43)
Vegetationsbeobachtungen an Lupinen in verschiedenen geographischen Breiten. (**Observations on the vegetation of lupins in various geographical latitudes**).
Züchter 1940 : **12** : 129–39.

The experiments set out in this paper were undertaken in order to observe the influence of light and temperature on the vegetation of lupins.
The varieties tested are *L. luteus*, *L. angustifolius* and *L. albus*. Field experiments were carried out at latitudes of 52° N. and 32° N.
The vegetative period of *L. luteus* and *L. angustifolius* grown at 52° N. was lengthened by over 100%, as against the same varieties grown at 32° N.; *L. albus* showed a lengthening of the vegetative period of only 18%. The chief reasons are the shorter day length and to a lesser extent the temperature prevailing during the germination period.
For *L. luteus* and *L. angustifolius* the period from germination to blossoming was most affected, while the period from blossoming to maturity showed only slight differences from one latitude to the other. For *L. albus* the contrary is true.
L. angustifolius and *L. albus* show varying reactions to environmental conditions, a fact due probably to genetic differences.
The wild forms of *L. angustifolius* resulting from natural selection are relatively insensitive to changes in day length; the same applies also to the wild forms from the eastern Mediterranean.
The literature published on the subject is discussed, and the experimental conditions and results are set out in tables and graphs. E. M. F.

1002. 633.367:581.192:575.11(43)
Sengbusch, R. v. 633.367:581.148:575.11(43)
Die Züchtung von Süsslupinen mit nichtplatzenden Hülsen. Die Kombination der Eigenschaften "Alkaloidfrei" und "Nichtplatzen der Hülsen" und die Bedeutung der doppelt und dreifach recessiven alkaloidfreien Formen für die Süsslupinenzüchtung. (**The breeding of sweet lupins with indehiscent pods. The combination of the qualities of "indehiscent pods" and of "absence of alkaloids" and the importance of double or treble recessive alkaloid-free forms for the breeding of sweet lupins**).
Züchter 1940 : **12** : 149–52.

It appears from previous studies that the character of non-dehiscent pods depends upon a single recessive gene. This gene was termed *inv.*
F_1 lupins are not very suitable material for genetic analysis owing to their poor seed production and to the frequently occurring self infertility. In the second generation sweet

plants with non-dehiscent pods were found, indicating that the transmission of both these qualities is possible without particular difficulties.
In breeding plants of this type it is necessary to select the greatest possible number of F_2, F_3 and F_x plants. It is furthermore advisable to select the sweet and non-dehiscent individuals in the F_2 generation, and to study the remaining F_2 plants which are heterozygous for one or both of the two characters. Further selection of sweet and non-dehiscent plants is made in the F_3. The same procedure may be repeated with the F_4 or F_5. As a rule the races are not entirely free from alkaloids. Complete absence of alkaloids may be achieved by combining two, three or more of the recessive genes for alkaloid content in one variety. Sweet plants with two recessive genes may then be isolated by back-crossing F_2 plants with their parents. One difficulty in practical breeding is due to the fact that it is difficult to separate double recessive from single recessive plants. Therefore it is necessary to discover new individuals possessing one gene which involves the complete absence of alkaloids. E. M. F.

1003. 633.367:581.6:575(43.8)
CZARNOCKA, J. 633.367:581.48:575.061.6
Polski żółty łubin pastewny. (**The Polish yellow fodder lupin**).
Przegl. Roln. 1946 : **1** : 11–13.

Prolonged study of many species and varieties of lupin showed that the wild species *Lupinus hirsutus* from southern Spain and North Africa contained the lowest amount of bitter alkaloids and was least poisonous. This lupin, acclimatized in Poland, was used in selection experiments with the aim of shortening the vegetative period; simultaneously hybridization with other Polish lupins was carried out to eliminate the bitter qualities, if possible. Two lupins with shorter vegetative periods resulted. During this work some races of seeds, with different coloured seed coats, were isolated from a population of yellow lupin; of these seed races No. 30 is pure white and of high 1000 grain weight, No. 23 is white flecked with brown, No. 42 is black with a white stripe and No. 13 is chocolate brown with a white stripe.
During the occupation, the German sweet lupin was exclusively grown. Work had been in progress since 1937 on the transference of the sweet character from this lupin to the above mentioned Polish better races with the different coloured seed coats. Determination of the low alkaloid content of the resulting hybrids was difficult; moreover the amount of alkaloid was found to vary in different years and is related to atmospheric conditions, type of soil, etc., in addition, segregation of bitter forms may occur. A method of separating the alkaloids lupinine and the poisonous sparteïne was finally evolved at the Puławy Institute. This is of importance to breeders, who can now select their material with these constituents in such proportions that sparteïne should be present in the minimum amount. As a standard for tests, the limiting value of 0·10% was fixed for the average amount of bitter alkaloid, this figure being chosen on the basis of data from bitter lupins grazed with impunity whilst containing this percentage of bitter alkaloid in the seed.
The seed races Nos 30, 23, 42 and 13 are being sown on a larger scale than hitherto for comparison. Results so far have shown the Polish Yellow fodder lupin to be highly satisfactory. Compared with the blue lupin the yellow lupin grows well in poorer soils, yields a greater amount of green material per unit of area, and has a protein content of 40% as compared with 30% for the blue. The protein of the yellow lupin has been found to be biologically equal in value to that of the soya bean. E. W.

ROOTS AND TUBERS 633.4

1004. 633.41:575(48.5)
JOSEFSSON, A. 633.42:575(48.5)
Rotfrukter. (**Root crops**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 271–79.

That root crops are relatively rarely placed on the market under new names is due to the fact that much of the work done at Svalöf on these crops has been and is concerned with the maintenance of the purity of existing varieties by constant selection and their improvement by similar means. Where strains are, however, comparatively uniform, hybridization is

employed to obtain marked improvements in, for example, sugar content, yield, dry matter content and root shape. The parent types may be either (1) varieties differing greatly from each other, or (2), where the rapid production of commercial seed in the F_1 is desired, varieties closely resembling each other in form and general appearance. In the latter case use is made of heterosis which may in some cases be very marked. The techniques used in these two types of breeding are described with observations on their effectiveness. In connexion with the second type of breeding the testing of various hybrid combinations has been actively pursued at Svalöf.

For over 30 years the Swedish Seed Association has been occupied with beet breeding to obtain types showing maximum yield of dry matter, reliability in cropping, good keeping properties, desirable root shape and minimum bolting. The progress made up to the present is discussed, and new varieties and strains released during the last ten years, e.g. the sugar mangel Nova (1940), Svalöfs Röd Kägla (1944), as well as a number of varieties and strains not yet on the market are mentioned. Among the latter are the sugar mangel strains 046 and 048, both being white and having green tops; their average for dry matter content was as high as 18–19%, and for sugar content 12–13% or nearly as high as the dry matter content of Barres Halvlång [Barres Semi-long]. Furthermore, in trials at Svalöf they surpassed Rubra II in dry matter by 11–12%, and Nova by 4%. In root form and habit strain No. 046 ranks first and differs little in these respects from Nova. Strain No. 048 has a less plump root. Selection for a plumper root is proceeding, but the dry matter content, which is the main justification for the type in question, must not be much reduced. Which of the two strains has the best combination of characters is being investigated.

In 1943 a new green topped swede strain, No. 016, was handed over to the General Swedish Seed Co. [Allm. Sv. Utsädesaktiebolaget]. It has a remarkably fine, big root and has given particularly high yields, e.g. at the Östgöta Branch Station about 18% more dry matter than Gul Svensk [Yellow Swedish] or Götakålrot [Göta Swede]; in dry matter content it is somewhat below Gul Svensk but higher than Götakålrot.

Two new turnips J 014 and Vg 024 have already been described (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 531).

1005. Lucas, E. H., Sell, H. M. and Lewis, R. W. 633.42:615.778

An antibiotic substance obtained from seeds of Brassicas.

Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 361–62.

It has been observed that the seed extracts of several species of *Brassica* contain an antibiotic agent. The results obtained from the use of extracts of several species of *Brassica* and numerous varieties of *B. oleracea* indicate that the antibiotic effect is specific. Further experiments will show whether this specificity is due to genetic differences or the effect of external conditions.

1006. Lackamp, J. W. 633.42–2.412.5–1.521.6:581.6

Over den smaak van stoppelknollen in verband met den weerstand tegen knolvoet. (**The taste of turnips in relation to the resistance against club root).**

Tijdschr. PlZiekt. 1947 : **53** : 49–54.

A. J. P. Oort concluded, in a recent article (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1717), that resistance to club root is correlated with a low content of mustard oil and suggested an investigation into the flavour of turnip varieties exhibiting a known resistance to club root.

As a result of experiments started in 1943 information was available at the Central Institute for Agricultural Research, Holland, on this problem.

In considering the flavour, a distinction is made between sharpness, which burns the tongue, and is localized in the skin, and the typical flavour of turnips, alone or adulterated with other flavours. Sharpness probably depends on the mustard oil content, but the flavour depends on various components, so that there can be no question of simple correlation of taste and content. Estimation of mustard oil content by means of ammoniacal silver nitrate was found to be unsatisfactory and no evidence of any relationship between the

figures so obtained and sharpness of taste could be found; nor is there any relation between resistance to club root and blackening with silver nitrate.
It is concluded that breeding of races resistant to club root need not result in less pleasant flavours. C. B.

1007. 633.426:575(43.8)
633.426–2.111–1.521.6
BARBACKI, S. 633.426–2.112–1.521.6
O uprawie rzepaku ozimego. (**The cultivation of winter rape**).
Przegl. Roln. 1946 : **1** : 10–11.

All the known varieties of rape fail to weather severe winters. One of the most winter hardy Polish varieties is that from Wolhynia, also sown in central Małopolska. In pre-war tests, varieties of Polish origin, though inferior in yield to pedigree varieties, surpassed them under hard winter conditions. A useful mid-early ripening variety, Wielkopolska Sobótka (Great Poland Bonfire), from the Państwowe Zakłady Hodowli Roślin (State Institutes of Plant Breeding) shows good yields and satisfactory resistance to frost and drought. The variety Łęcki bred by Rożański at Kutnowski is also satisfactory; Janetzki and Nordost Knaphauser (North-east Knaphauser) are also worthy of note. The latter, derived from a local variety in East Prussia, lodges easily, but it is winter hardy and needs no exceptionally favourable conditions.
To survive the onset of winter, rape plants must develop early, but without over-growth and on no account must they be near the flowering stage. The seeds for sowing should be dark in colour and fully mature. E. W.

1008. BEGGS, J. P. 633.426–2.412.5–1.521.6:575.42(93.1)
Production and management of the rape crop.
N.Z. J. Agric. 1947 : **75** : 289–93.

Notes are included on the three rape strains which are used as fodder in New Zealand: Giant, Broad Leaf Essex I and Broad Leaf Essex II. A club root resistant strain has been under trial for several years. The strain is a selection of Giant rape, and as the result of the trials carried out by the Agronomy Division of the Department of Scientific and Industrial Research and the Fields Division of the Department of Agriculture it is considered likely that the strain will prove valuable in districts where club root is a serious disease. It matures slightly later than Broad Leaf Essex but is similar to this strain in palatability.

1009. STEVENSON, F. J. 633.491(73)
New varieties of potatoes.
Amer. Potato J. 1947 : **24** : 247–60.

Information is given on the present commercial status of new potato varieties distributed to growers in the various regions of the United States during the period 1932–46.

1010. HUDSON, P. S. 633.491:575(42)
Work of the South American potato collection callendar year, 1946.
17th Rep. Imp. Agric. Bureaux Executive Coun., London 1945–1946 (1947) : 22–23.

Tests were made on 183 lines for resistance to virus Y. Tests for wart resistance, eelworm resistance and frost resistance and observations on blight resistance were also carried out. The influence of various factors on the ascorbic acid content of varieties was studied. Work on photoperiodism has confirmed the conclusion that the bolter condition is due to a gene or genes controlling the photoperiodic response. Field work included pollination and the recording of observations. Trials were laid down to test the constancy of variety differences in vitamin C content and in the effect of environment and stage of maturity at harvesting, the effect of virus disease upon vitamin C content, and the effect of vernalization on establishment and yield.

1011. TEDIN, O. 633.491:575:581.6(48.5)
Potatis. (**Potatoes**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 261–70.

Owing to the character of the soil, changes have had to be made from time to time in the

regional distribution of research on potatoes at Svalöf and other such centres in Sweden and the experiments done on sandy soil during the past eight years have led to new problems and methods in potato breeding which are outlined in the present review.
Though aims in breeding differ according to whether the varieties are to be used for industrial purposes or for human consumption as main crop or new potatoes, good yielding capacity, reliable cropping and resistance to diseases are always required. The relative importance of these criteria, and also particular aspects of quality such as the content of starch and of vitamin C in the Swedish breeding programme is indicated.
Breeding methods are discussed in detail and also from somewhat different points of view from Tedin's discussion in 1942 (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 872). Investigations on how seed should be obtained and whether Swedish land varieties are suitable for breeding purposes receive special mention.
A short note on four new varieties, Sv 38171, Sv 39108, Sv 39156 and Sv 42096, undergoing multiplication by the Seed Co. [Utsädesbolaget] before release to the market, and on the raising of virus free élites from them concludes the paper.

1012. Monot, G. 633.491:575.42
A propos d'une nouvelle méthode de sélection. (**Concerning a new method of selection**).
Pomme de Terre Française **1947** : **10** : 10–12.
A method of selection in potato breeding is described.

1013. Kulczycki, J. 633.491:575.42(43.8)
Zagadnienia ziemniaczane. (**Potato problems**).
Przegl. Roln. **1946** : **1** : 80–81.
Multiplication with clonal selection is the projected method for improving the stocks of potatoes. Polish varieties mentioned which are being multiplied for seed are: Marszałek (Marshal), Hetman (Commander), Świteź and Kmieć (Peasant). Marszałek is noted for its flavour and high resistance to viruses and, owing to its thick hairy leaves, also to the Colorado beetle. E. W.

1014. Hawkes, J. G. 633.491:581.143.26.035.1
The photoperiodic reactions of potato bolters.
Emp. J. Exp. Agric. **1947** : **15** : 216–26.
The behaviour of bolter and normal potato plants was compared under long and short day conditions. Two varieties with different dates of maturity were used in the experiment, viz. Gladstone, an early maincrop variety, and Sharpe's Express, a first early. Observations were made on the following characters: (1) plant height, (2) flowering, (3) maturity, (4) tuber weight and number, and (5) stolon length and number.
Under long day treatment bolter plants of both varieties were significantly taller, matured earlier, flowered more freely and had longer stolons than the normal. Under short day conditions these differences were eliminated. As regards weight of tubers, total number of tubers, number of large and small tubers, number of stolons per plant, the varieties gave following results.
Bolter and normal plants of Gladstone exhibited no significant differences in tuber weight and number of stolons per plant under either long or short day conditions, probably because under the conditions of the experiment the bolter plants were lifted before the tubers had reached full maturity. Under long day treatment bolters of Sharpe's Express, harvested at the stage of full maturity, showed an increase in tuber weight and stolon number compared with the normal plants; under short day conditions no differences were shown.
No significant differences were found in the total number of tubers developed by bolter and normal plants of Gladstone under either long or short day conditions. If, however, the large tubers were considered, i.e. tubers over $\frac{1}{2}$ inch long, the normal plants yielded significantly more tubers than the bolters under long day treatment; but under short day treatment no significant differences existed between normal and bolter plants. No significant differences between bolters and normal plants of Gladstone were shown in respect of the small tubers, i.e. tubers $\frac{1}{2}$ inch long or less, either under short or long day treatment. Bolter and normal plants of Sharpe's Express, on the other hand, showed

significant differences in the total number of tubers under both long and short day conditions. Under long day treatment the bolter plants yielded significantly more tubers than the normal, but under short day treatment the position was reversed and the bolters yielded fewer tubers. Bolter plants of Sharpe's Express yielded significantly more large tubers than the normal under long day treatment; under short day treatment the bolter and normal plants showed no differences as regards number of large tubers. Under short day treatment normal plants produced significantly more small tubers than the bolters; since the increase in tuber number of the normal plants compared with the bolters under short day treatment was due only to an increase in the number of small tubers this difference did not result in significant differences in the weight of tubers produced by the normal and bolter plants and under short day conditions.

No significant differences between bolter and normal plants of Gladstone were obtained for stolon number under either long or short day treatment, a result corresponding to that obtained for the total number of tubers. Under long day treatment bolter plants of Sharpe's Express developed significantly more stolons than the normal; under short day treatment no differences were recorded. The latter result does not agree with the result obtained for number of tubers, since the increased number of tubers, in the form of small tubers, developed by the normal plants under short day treatment is not reflected in an increased number of stolons. It was observed that small tubers were produced laterally on stolons or sessilely on the main stems, suggesting that the increased number of small tubers on the normal plants were developed in this way.

In general, the results support the hypothesis previously suggested by the author (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1069), that the bolter differs from the normal plant in respect of its photoperiodic response, and appears to be a reversion to the more ancestral type of short day adaptation of the potatoes cultivated in the Andes. Additional evidence has thus been obtained in support of the probable Andean origin of European potato varieties.

1015. Willigen, A. H. de and Groot, P. W. de 633.491:581.192:578.08

Schattingsmethode voor het kaligehalte van aardappelen door meting van het geleidingsvermogen. (**Estimation of the potash content of potatoes by measuring the conductivity**).

Landbouwk. Tijdschr. Wageningen 1947 : **59** : 227–28.

The estimation of the potash content of potatoes is often desirable in field experiments, but is cumbersome and costly and must be carried out by trained analysts. Normally a stable preparation was made, by dyeing, that could be analysed when convenient; but even so sufficient analyses could not be made. Substitution of ash determination was no improvement as complete ashing at the maximum permissible temperature takes too long. Measurement of the conductivity of dried potatoes is a practical method as most of the ash consists of potash and variation in the other constituents can have but little effect. The only exception is chlorine; but this is not serious as on sand and peat soils in Holland, high chlorine content is correlated with extremely high potash content.

The conductivity does, however, increase rapidly on storage for a relatively short period. Storage for 24 hours in a refrigerator increased the figure from 9000 to 12,800 ($\times 10^{-6}$ Ohm^{-1} cm^{-1}). Since drying takes some hours, the applicability of the method was tested on 35 samples of dried potato of which the potash content was known. The results are shown in a table, arranged in four groups according to the conductivity of the filtrate, after heating with water to 35° C. for some hours, together with the average maximum and minimum potash content for each group. The accuracy is apparently sufficient to distinguish between samples with low, moderate and good to high contents (conductively 2000–2200, 2200–2400, and 2400 upwards respectively), but above 2400 does not indicate a high content with certainty. The method has the advantages of being carried out with simple apparatus, already available in many laboratories, that a large series of determinations can be made by assistants, and that it requires very little time.

Investigation of the use of the method with fresh sap is planned, but this requires an apparatus to extract a sufficiently pure sap. C. B.

1016. FJAERVOLL, K. 633.491:581.6(48.1)
Potetdyrkinga i Troms og Finnmark fylke. (**Potato growing in Trom and Finnmark counties**).
Meld. Stat. Forsøksgård Holt 1941–42 (1944) : H 8–57.
Meld. Stat. Forsøksstasjoner Plantekult 1942 (1944).
Tillegg H til Landbruksdirektorens årsmelding 1942.

This account of potato variety trials in Norway from 1930 to 1931 and 1933 to 1939 contains information on quality, including vitamin C content and cooking properties. Foreign and Norwegian varieties were tested.

1017. HELLBO, E. 633.491:581.6(48.5)
Kvaliteten hos årets matpotatis. (**Quality of the year's table potatoes**).
Lantmannen 1947 : **31** : p. 999.

Blackening during cooking is attributed to defective balance of nitrogen and potassium in the soil, while breaking during cooking is regarded as largely a varietal character and is found specially in varieties such as Alpha that are rich in starch.

1018. RASMUSSEN, L. 633.491:581.6:578.08(48.9)
Forsøg vedrørende Kartofler. Udført under Ledelse af Kartoffel Kvalitetsudvalget. (**Experiments on potatoes. Carried out under the direction of the Committee on Potato Quality**).
Beretn. Planteavl. Sjaelland 1941 (1942) : 171–87; 1942 (1943) : 175–90.

Of interest to plant breeders in these two reports are the particulars given of the method of testing potatoes for cooking quality and formulating the results.
The 1941 report also contains similar information regarding tests for storage properties (cf. Abst. 862).

1019. SCOTT, R. A. 633.491–1.521.5:576.16(94.6)
The Tasmanian Brownell potato.
Tasm. J. Agric. 1947 : **18** : 97–102.

The article collates early historical references to the Tasmanian Brownell potato and varieties regarded as synonymous; the botanical descriptions of the synonymous varieties are also given. It is mentioned that material has been introduced and is being compared with strains of the Tasmanian Brownell potato, in the attempt to establish the origin of the variety.

1020. 633.491–1.524:575
HAWKES, J. G. 633.491–2.411.4–1.521.6:575.11
Classification breeding and preservation of the potato.
Nature, Lond. 1947 : **160** : 843–44.

An account is given of the discussions on potato breeding and allied problems which took place at a symposium arranged by the Association of Applied Biologists and held in October 1947. The subjects dealt with included the characteristics and use of South American potatoes and the genetics of blight resistance.

1021. 633.491–1.557(44)
Résultats en Saône-et-Loire. (**Results in Saône-et-Loire**).
Pomme de Terre Française 1947 : **10** : No. 100 : p. 24.

Yield data are presented for eight potato varieties tested in 1947.

1022. BLACK, W. 633.491–2–1.521.6:575(42)
Disease resistance in potatoes.
Farming, London 1947 : **1** : 327–31.

The possibilities of breeding for resistance in the potato to diseases and pests are discussed, with particular reference to potato production in Britain.

1023. VLIET, N. 633.491–2–1.521.6:575(49.2)
El cultivo y la selección de nuevas especies de papas. (**The cultivation and selection of new sorts of potatoes**).
Rev. Inst. Defensa Café, Costa Rica 1947 : **18** : 165–68.

The methods used in Holland to develop disease resistant varieties of potatoes are briefly outlined.

1024. Stevenson, F. J. and
Akeley, R. V. 633.491–2–1.521.6:575(73)
Breeding healthy potatoes.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 327–32.
Potato breeding for disease resistance in the United States is outlined.

1025. Thenard, J. 633.491–2–1.521.6:575.42
Un projet de modification et d'amélioration de la sélection de la pomme de terre. (**A scheme to modify and improve potato selection**).
Pomme de Terre Française 1947 : **10** : No. 92 : 15–17.
Methods of artificial selection of potatoes for disease resistance are discussed.

1026. 633.491–2–1.521.6:582:575
Hawkes, J. G. 633.491:581.9:576.312.35
Some observations on South American potatoes.
Ann. Appl. Biol. 1947 : **34** : 622–31.
After discussing briefly the problem of breeding for disease resistance in potatoes, and giving an outline of the work which is in progress at Cambridge on the Empire Potato Collection, the author deals with the taxonomy, distribution and chromosome numbers of the indigenous American potatoes.

1027. 633.491–2.11–1.521.6:575(73)
Folsom, D. 633.491–2.11–1.521.6:578.08(73)
Inheritance of predisposition of potato varieties to internal mahogany browning of the tubers.
Amer. Potato J. 1947 : **24** : 294–98.
Internal mahogany browning of stored potatoes is an important cause of loss in certain commercial varieties grown in the northern states. Its development depends upon the temperature of storage, and as is shown by the tests of seedling and commercial varieties reported in the present paper, a heritable disposition to browning. The careful selection of parents for crosses is advocated as a means of minimizing the damage.

1028. Bruyn, H. L. G. de 633.491–2.3–1.521.6(49.2)
Wisselbouw van aardappelrassen als bestrijdingsmiddel tegen schurft. (**Rotation of potato varieties to prevent scab**).
Tijdschr. PlZiekt. 1947 : **53** : 139–43.
Passage of the scab organism through a susceptible potato variety increases its virulence. Cultivation of varieties resistant to many races of scab should therefore reduce both the virulence and number of the scab organisms present in the soil.
Four varieties, Alpha, Bintje, Eigenheimer and Jubel, were grown for six consecutive years in the same heavily infected sand in a frame, each variety being separated from the others by a glass partition. They were manured with ammonium phosphate and sprayed with Bordeaux mixture. During the seventh year the sand was fallowed and the following year each quarter was planted with equal numbers of plants of Bintje and Eigenheimer. The degree and type of attack were least severe after Jubel; after Bintje there was much superficial scab, and after Eigenheimer many deep lesions. Details and photographs of the results are given. C. B.

1029. 633.491–2.3–1.521.6:575.12
Monot, G. 633.491–2.485–1.521.6:575.12
Compte rendu sur un voyage d' études en Tchécoslovaquie du 23 au 30 Juillet 1947. (**Account of a study trip in Czechoslavakia from 23 to 30 July 1947**).
Pomme de Terre Française 1947 : **10** : No. 98 : 12–15.
Observations are included on the breeding of new potato varieties in Czechoslovakia, and the testing of them for resistance to *Actinomyces* and *Rhizoctonia Solani*.

1030. REDDICK, D. and PETERSON, L. C. 633.491–2.411.4–1.521.6:575(73)
New blight-resistant varieties.
Amer. Potato J. 1947 : **24** : 319–36.

Detailed descriptions are given of the new blight resistant potato varieties, Placid, Virgil, Ashworth and Chenango, which were released for increase in 1946 as a result of the decisions of the Empire State Potato Club, New York State.

The variety Placid is a hybrid involving *Solanum demissum, S. Fendleri,* Imperia, Katahdin and other varieties in its parentage. It shows wide adaptability in New York State. The tuber set, growth period and date of maturity are fairly similar to those of Katahdin. The tuber eyes are well-distributed, and each eye produces a strong sprout. The cooking qualities are good. Repeated inoculations of vigorous plants of Placid with *Phytophthora infestans* have resulted in an immune reaction. Infection has however been observed under certain circumstances. Inoculation with virus X by means of a grafted scion from the carrier variety Rural New Yorker has given no reaction. When inoculated by grafting with "severe" virus X from Katahdin, the variety Placid develops a brilliant mosaic. Graft inoculating with virus Y produces an indefinite mosaic. Placid has proved susceptible to leaf roll and common scab.

The variety Virgil has been derived from the third back-cross of a plant from a collection of *S. demissum* made in Mexico in 1930. In heat and drought tolerance Virgil is superior to Placid. The cooking quality is considered to be the best among the four varieties released, but the shape of the tuber is not entirely satisfactory and the eyes are somewhat too deep. As in the Placid variety, the eyes are well distributed, and are without apical dominance so that each eye produces a good sprout. The variety is susceptible to rugose mosaic and common scab; it gives a passive reaction to virus X. Indication has been obtained that in Virgil the immune reaction to blight is further over the threshold of incidence than in Empire and Placid.

The variety Ashworth contains *S. demissum,* a heterozygous variety indigenous on the Island of Chiloé erroneously termed *S. Maglia,* Silhonetto (Sylvan x Hindenburg), Katahdin and several unnamed seedlings in its parentage. Its tubers are similar to those of Katahdin in size, shape and appearance; in cooking quality the new variety is equal or superior to Katahdin. It is apparently immune to blight. Graft inoculation tests have shown that Ashworth is passive to virus X and virus Y. It is susceptible to leaf roll. The variety has been developed in St Lawrence County, but limited tests have indicated that the variety may be valuable for other areas in New York State.

S. demissum also formed the source of blight immunity in breeding the variety Chenango. In addition the pedigree of Chenango included *S. Fendleri,* Silhonetto, Imperial, Katahdin, Choquefrit from La Paz, Krantz seedling 41 – 2 – 10 – 1 and U.S. 46100. The variety matures early, being comparable in this respect with Cobbler and Chippewa. In dry seasons it tends to set too many tubers with the result that in such seasons too few tubers reach commercial size. It is apparently immune to late blight, and susceptible to leaf roll and virus Y; it gives a passive reaction to virus X, graft inoculated from the carrier variety Green Mountain. The tests so far conducted indicate that use of the variety should be restricted for the present to Chenango County, the area in which it was developed.

In 1947 the Empire State Potato Club decided to release the following new varieties for increase: Essex, an early maturing variety; Madison, a second early; Snowdrift; an early potato; Cortland, a main crop variety; and Fillmore and Harford, both late maturing varieties.

The use of the potato Empire (cf. *Plant Breeding Abstracts,* Vol. XVI, Abst. 1313) is not advocated, since its tubers show little or no resistance to blight.

1031. CHESTER, K. S. 633.491–2.411.4–1.521.6:575(73)
Science on the march.
Sci. Mon., Lond. 1946 : **63** : 73–76.

Reference is made to the breeding of potatoes for resistance to blight in the U.S.A. Sebago, a variety comparable to Green Mountain and described as the best potato for Wisconsin, is reported to have given good results in Maine, New York, Florida, Michigan, Minnesota and

western Washington, but it has recently shown signs of losing its blight resistance. New York bred varieties, fully immune to blight, such as Empire, Placid, Virgil, Chenango and Ashworth, will be available, it is stated, in the autumn (cf. Abst. 1030).

1032. 633.491–2.411.4–1.521.6:575(82)
Creación de variedades de papa. (**Creation of potato varieties**).
Min. Agric. Nac. Rep. Argent. 1947 : **85** : p. 25.

The Balcarce Experimental Station is engaged in breeding high yielding potato varieties adapted to the conditions in the south-eastern part of the Province of Buenos Aires. Three selections resistant to *Phytophthora* have been obtained.

1033. Black, W. 633.491–2.411.4–1.521.6:575.11
Blight in relation to potato breeding.
Ann. Appl. Biol. 1947 : **34** : 631–33.

The results of tests for immunity to strains A, B and C of *Phytophthora infestans*, carried out on potato seedlings bred from *Solanum demissum*, are presented. A fourth strain D which was isolated appeared to be a weak form of C from which it differed only in degree of virulence.

Resistance to strains A, B and C appears to be controlled by four dominant genes, *Ra*, *Rb*, *Rc* and *Rbc*. Minor genes determining the degree of susceptibility in susceptible varieties and acting as modifiers in resistant ones, seem also to be involved. The excess of recessives compared with standard Mendelian ratios in progenies segregating for resistance may be due to differential compatibility of gametes.

The immunity genes present in parent varieties were determined by means of progeny tests. The degree of resistance conferred by *Rb* genes appeared to be different in different progenies.

It is concluded that blight strains differing qualitatively like B and C may develop and that these qualitatively different lines may show quantitative differences in virulence, as indicated by the plasticity of B and D. The number of recognizable strains is presumed to be large and dependent upon the range of test plants available for differentiation of the fungus.

1034. Montaldo, A. and
Akeley, R. V. 633.491–2.411.4–1.521.6:575.12
Herencia de la reacción a la *Phytophthora infestans* en la papa. (**Inheritance of reaction to *P. infestans* in the potato**).
Agric. Tec. Chile 1946 : **6** : 12–41.

The degree of resistance to *P. infestans* of the selfed progenies of the two susceptible clones S 47102 (S 45146 x Earlaine) and 336–18 (President x Katahdin), and the resistant clone 96–56 (W 3895 x Earlaine) was examined, also the reaction of the progenies of 336–18 x 96–56 and S 47102 x 96–56. In both the latter two cases, the progenies showed transgressive inheritance of resistance, the mean index of resistance of each of the progenies exceeding the mean value of the resistant parent.

A correlation coefficient of $r = + 0{\cdot}54$–$0{\cdot}57$ was obtained between the tuber and vine reactions of the selfed progenies of 96–56 and the two crosses. The correlation coefficient for the selfed progeny of 336–18 was not significant.

Tuber firmness was significantly correlated with resistance, $r = + 0{\cdot}53$ and $r = + 0{\cdot}56$ respectively, in the progenies of 336–18 and 336–18 x 96–56, but there was no significant correlation for 96–56, S 47102 and S 47102 x 96–56.

1035. Müller, K. O. 633.491–2.411.4–1.521.6:575.127.2(43)
Il problema della selezione di varietà di patate resistenti alla peronospora. (**The problem of breeding blight resistant potato varieties**).
Ital. Agric. 1943 : **80** : 342–46.

It is shown that blight resistance in potatoes is not an absolute property dependent on the presence of some definite substance but can vary with temperature or other environmental conditions. By the use of hybrids between domestic potatoes and a South American species referred to as *Solanum indigenum* [*sic*], hybrids resistant to the common form of *Phytophthora infestans* have been produced. These include Aquila, a culinary or industrial

potato which is also resistant to virus attack and gives a high yield of starch per acre; Erika, an industrial or forage potato with the maximum yielding ability; Frühnudel, a culinary type combining high yield and earliness; Robusta, an industrial type with very high starch content, also resistant to virus; and Roswitha, an early mutant of Robusta.
Other hybrids with *S. demissum* are resistant to races of *Phytophthora* other than the common biotype.

1036. M....., J. 633.491–2.411.4–1.521.6:581.6
Quelques hybrides d'amérique résistant au mildiou. (**Some American hybrids resistant to blight**).
Pomme de Terre Française 1948 : **11** : 15–16.
Notes on the characteristics of the following new American blight resistant potato varieties are presented: Placid, Virgil, Ashworth and Chenango (cf. Abst. 1030). The variety Empire which is normally susceptible to blight is also reported to have given resistant plants.

1037. 633.491–2.412.5–1.521.6:575(41.5)
New varieties of potatoes. Results of trials at Stormont.
Mon. Rep. Minist. Agric. N. Ire. 1947 : **22** : 231–33.
A report is given of trials of new wart immune potato varieties in comparison with standard varieties. The wart immune varieties tested have been bred by J. Clarke, Ballycastle, County Antrim, and have the prefix "Ulster" to their names. They include Ulster Earl, Ulster Cromlech, Ulster Supreme, Ulster Leader, Ulster Ensign, Ulster Premier, Ulster Chieftain, Ulster Prince and Seedling 1056. The two last named varieties were commercially distributed in 1947. Ulster Prince is an early maturing variety, the tubers reaching a marketable size earlier than those of Arran Pilot and Ulster Chieftain. It is believed that the foliage of Ulster Prince is highly resistant to virus attack. The tubers are white and oval. Seedling 1056, for which the name Ulster Emblem has been reserved, is a second early variety; in three years' trials it has given higher yields than British Queen and Dunbar Rover. The tubers are white and kidney-shaped; they are described as very attractive in appearance.

1038. Stringer, A. 633.491–2.7–1.521.6
A note on the resistance of *Solanum polyadenium* to aphids.
Rep. Agric. Hort. Res. Sta. Long Ashton, Bristol 1946 : 88–89.
Data have been obtained suggesting that the immunity of *S. polyadenium* to aphid attack may be due to the repellent action of the free oil present on the surface of the plant, and the accumulation by the insect of a gummy secretion around the tarsi which has the mechanical effect of preventing the insect from feeding.

1039. Stelzner, G. and Schwalb, H. 633.491–2.8–1.521.6
Die Virusanfälligkeit von *Solanum demissum*-Herkünften. (**The susceptibility to virus of forms of *S. demissum* of different origin**).
Züchter 1943 : **15** : 187–90.
The great susceptibility of the wild species *S. demissum* to potato viruses and particularly to virus A was observed. This study is an account of trials undertaken in order to establish whether forms of this species could be used for the testing of potato breeding material for susceptibility to virus A.
The forms used in these tests include *S. demissum*, *S. demissum* f. *utile*, *S. demissum* f. *xitlense*, *S. demissum* f. Rio Frio, *S. demissum* f. Bukasov and *S. demissum* f. Bukasov 029. The viruses A, Y and X were studied. Infection with virus Y was carried out by means of *Myzus persicae*.
S. demissum f. *xitlense* was found resistant to virus X but highly susceptible to virus A and Y, f. Bukasov reacted in a very similar way, while f. Rio Frio was most susceptible to inoculation with virus A.
Other Solanaceae tested for susceptibility to the potato viruses A, Y and X were *Nicotiana alata*, *N. fragrans* and *N. longiflora*. E. M. F.

1040. Vasudeva, R. S. and 633.491–2.8–1.521.6(54)
Ramamoorthy, C. S. 633.71–2.8–1.521.6(54)
Studies on the virus diseases of potatoes in India. III. Occurrence of *Solanum* virus 3. Murphy and M'Kay.
Indian J. Agric. Sci. 1946 : **16** : 206–08.

The reactions to *Solanum* virus 3 of the potato varieties, Phulwa, Darjeeling Red Round and President, the tobacco varieties White Burley and Harrison's Special, and of *Nicotiana glutinosa* L. and *Datura Stramonium* L. are described.

1041. Mai, W. F. 633.491–2.8–1.521.6(74.7)
Virus X in the newer potato varieties and the transmission of this virus by the cutting knife.
Amer. Potato J. 1947 : **24** : 341–51.

In New York State plants showing disease mosaic have recently been observed in fields of the Katahdin, Sebago and Chippewa potato varieties; these varieties are known to show either field resistance to the viruses causing mosaic in the older American varieties or to react with symptoms differing markedly from those observed in these fields. The virus causing the mosaic disease was identified as virus X.

The results are given of experiments on the reaction of 12 virus X free American varieties to graft infection with virus X and virus B from Green Mountain scions and from Katahdin scions infected with mild, medium and severe types of virus X. Experiments were also carried out on the transmission of virus X by means of the cutting knife. On the average approximately 10% of the healthy seed pieces cut with a virus-infected knife became infected with virus X; a considerably higher percentage of transmission was obtained with the severe type of virus X than with the mild type.

1042. Bawden, F. C. and 633.491–2.8–1.521.6:575
Kassanis, B. 632.8:575.24:576.12
The behaviour of some naturally occurring strains of potato virus Y.
Ann. Appl. Biol. 1947 : **34** : 503–16.

The reactions of the potato varieties Majestic, King Edward, Doon Star, Arran Banner, Arran Pilot, Gladstone and Katahdin to different strains of potato virus Y and to virus C are described. During the three years of experiments the virus Y strains remained constant. The evolution of viruses is discussed in connexion with their transmission by insect vectors and the occurrence of mutations in both viruses and aphids which alter this. Breeding potatoes for resistance to infection is also discussed.

1043. Stelzner, G. and
Schwalb, H. 633.491–2.8–1.521.6:578.08
Reaktion einer Reihe von Solanaceen auf Infektion mit A-, Y-, and X-Virus der Kartoffel unter Berücksichtigung ihrer Brauchbarkeit als Testpflanze. (**Reaction of a series of *Solanaceae* to infection by A-, Y- and X-virus of potato with consideration of their utility as test plants**).
Phytopath. Z. 1942 : **14** : 497–511.

Sixty-eight different species of Solanaceae were tested with the A, Y and X viruses of potato, with a view to their use as test plants, especially for A virus in the potato. A good test plant is necessary for the A virus owing to the fact that its attack on potatoes is often masked. Only species showing clear symptoms at all seasons were to be chosen for test plants. The potato varieties Juli, Zeeuwsche Blauwe [Zealand Blue] and Jubel were used as the source of A, Y and X virus, respectively.

Nicotiana alata, *N. fragrans* and *N. longiflora* indicated the presence of the three viruses better than any of the other species tested. With *N. fragrans* the symptoms due to the A virus were stronger than those due to the Y virus, whereas no difference was seen in the case of the other above-mentioned species of *Nicotiana*. The course of the disease from the A virus was practically the same for all these three species, which were finally chosen as test plants. In these experiments the species were generally regarded as homogeneous, but in some cases were found to be populations from which quite possibly lines which would be

better indicators of symptom might be selected. The authors suggest isolation of lines might be advantageous in the case of *Physalis minima* and *P. philadelphica* which seemed promising at first but later showed lack of uniformity. E. W.

1044. Wilson, J. W. and
Sleesman, J. P. 633.491–2.95(77.1)
The differential response of potato varieties to spraying with DDT plus a fixed copper.
Amer. Potato J. 1947 : **24** : 260–66.

Tests were carried out in Ohio on the reaction of ten potato varieties to spraying with a mixture of DDT and copper oxychloride sulphate. Varietal differences in response to spraying, as shown by increases in yield, were recorded which corresponded to some extent with differences in varietal susceptibility to leafhopper and late and early blight, the more susceptible varieties tending to give the greater increases in yield.

1045. Flovik, K. 633.491.00.14(48.1)
Forsøk med potetsorter for tidlig opptaking. (**Trials with varieties of potatoes for early digging**).
Meld. Stat. Forsøksgård Holt 1941–42 (1944) : H 58–76.
Meld. Stat. Forsøksstasjoner Plantekult 1942 (1944).
Tillegg H til Landbruksdirektorens årsmelding 1942.

Mention is made of a Russian variety R No. 1527 tested only for two years so far. The shape of its tubers is poor, but yields have been promising and its frost resistance was higher than that of the other varieties in the trials.

FIBRES 633.5

1046. 633.51(62)
Afzal, M. 633.51–1.524(54)
Cotton growing in Egypt.
Indian Cott. Gr. Rev. 1947 : **1** : 167–78.

The production of cotton (*Gossypium arboreum*) in Egypt is described. A table shows the most important varieties grown in the last 25 years and their acreages. Acclimatization of present-day Egyptian cottons in the Punjab has been discarded as a possibility. In view of the need for improvement in the staple length of Indian cotton, two courses appear to be possible, viz., the production of hybrids between Egyptian and American cottons, and the synthesis of new long-staple cottons of the Egyptian type from biotypes introduced from Central America, which is believed to be the centre of origin of this species.

1047. Patel, P. L. 633.51:575(54)
Improvement of cotton in Middle Gujarat.
Indian Cott. Gr. Rev. 1947 : **1** : 184–89.

An account is given of early work on the selection of improved strains from Broach deshi cotton (*Gossypium herbaceum* var. *frutescens*), a high quality *Fusarium* wilt resistant type, and from the variety Goghari (*G. herbaceum* var. *frutescens*), a wilt susceptible type inferior in quality but with a high ginning percentage.

In 1932 the Broach Cotton Breeding Scheme was initiated by the Bombay Department of Agriculture, with the aim of developing wilt resistant strains with a high ginning percentage and high spinning capacity. None of the selections from the local material was found to fulfil the requirements in view. Broach deshi was crossed with Goghari types and introduced cottons superior to Goghari in fibre qualities; promising segregates were back-crossed with B.D.8. Segregates 1–2 and 1–6 from the back-cross [B.D.8 x Goghari A.26) x B.D.8] have proved to be the most satisfactory. These segregates are considerably superior to Broach Local (a mixture of Broach deshi and Goghari) in fibre qualities and spinning capacity; they are wilt resistant and have 7–8% higher ginning percentage than B.D.8. The strains are being distributed as a composite variety known as Vijay.

Further investigations are directed towards the improvement of the fibre length of B.C. 1–2 and B.C. 1–6 by crossing with the long stapled Surat 1027 A.L.F. cotton, and subsequently back-crossing. Breeding for early maturity with a view to escaping frost is also in progress.

1048. KHADILKAR, T. R. 633.51:575(54.7)
A peep into Khandesh cotton breeding work.
Indian Cott. Gr. Rev. 1947 : **1** : 190–94.

The Khandesh cotton tract is situated in the extreme east of Bombay Province. Although the local cotton (*Gossypium arboreum* var. *neglectum* f. *bengalensis*) gave high yield and high ginning percentage, it was unsatisfactory as regards quality and staple length. Breeding investigations were begun in 1921 at the Dhulia station, to obtain improved cottons for the tract. The variety N.R.6, derived from local material by single plant selection, was distributed in 1926; it was superior to the local cotton in ginning percentage but showed no improvement in staple length and yield of seed cotton. The variety Banilla was later bred from a cross between *G. indicum* and *G. cernuum*; this variety had a longer staple and higher ginning percentage than the local material, but in yield of seed cotton no improvement was secured. It was also found to be highly susceptible to *Fusarium* wilt. In 1932 the station was transferred to Jalgaon, where the wilt resistant strain 56–3 was selected from cotton introduced from the Central Provinces, and named Jarila. This variety is highly resistant to wilt, and has a staple length of 0·84 inches in comparison with the staple length of 0·70 inches of Banilla. Its ginning percentage, however, is 35 as against the ginning percentage of 38·5 of Banilla. Jarila was crossed with N.R.5, and a promising selection 197–3 with a ginning percentage of 38·5 and higher yield of seed cotton than Jarila has been produced, and will be released for general cultivation. Future problems include the development of wilt immune strains and improvements in yield and ginning percentage.

1049. 633.51:575(62.4)
General introduction and summary of the work of the Research Division, Department of Agriculture and Forests, Sudan 1946–1947 : Pp. 20 : (Mimeographed).

In addition to the following investigations reported on cotton, mention is made of varietal trials of sorghum, cassava, groundnut and soya bean.

The blackarm resistant X 1730 A types of Sakel Egyptian cotton grown at Gezira, viz. BAR 1730 L, BAR 4/5 and BAR 4/11, have been found to be equal to X 1730 A in spinning properties. In seed cotton yield none of the BAR strains reached the main crop yield of X 1730 A; in lint yield BAR 1730 L and a selection of BAR 1730 were nearest to X 1730 A. In the absence of blackarm the differences would presumably have been greater. An attempt is being made to improve the yields of these cottons and of other strains of X 1730.

The production of blackarm resistant Domains Sakel was continued at Shambat, by transferring the genes B_1, B_2 and B_3 from the resistant NT2 cotton to Domains Sakel Selection 1. A fourth gene B_4, and a major gene for blackarm resistance in the Grenadines white pollen type were also studied.

Progress was made in the bulk selection of Domains Sakel for leaf curl resistance. It appears that resistance depends upon the accumulation of minor genes. Back-crossing of blackarm resistant Domains Sakel to the leaf curl resistant form has been begun at Shambat.

The transference of major genes for hairiness from various types to Domains Sakel is being effected with a view to breeding jassid resistant cottons. Jassid resistance is important in view of the damage the pest causes in Northern Gezira and some White Nile regions.

Several wild cottons are almost immune to both pink and Egyptian bollworms; the transference of this resistance from *Gossypium Thurberi* and *G. armourianum* to New World cottons has reached the second back-cross stage with promising results, hexaploid parents being used in the first stage of the transference.

Breeding was carried out on BAR S.P. 84 and BAR B.P. 52 at Shambat. The bollworm resistant artificial hexaploid "*G. armadense*" was crossed with, and back-crossed to, XA 129. In Kordofan BAR S.P. 84 was selected, following its success in varietal trials in this region and Equatoria. The M.U.8 variety from Tanganyika, originally introduced from India, outyielded all other varieties, including BAR S.P. 84.

1050. ROBERTY, G. 633.51:575.127(62)
Les cotonniers sauvages du Djebel Markhayat (Soudan anglo-égyptien).
[**The wild cottons of Djebel-Markhayat (Anglo-Egyptian Sudan).**]
Bull. Soc. Bot. Fr. 1946 : **93** : 39–42.

Two *Gossypium* spp., *G. anomalum* and *G. somaliense*, are stated to grow on the high plateau

of Djebel Markhayat. There is no sign of hybridization between them. The author is of the opinion that *G. somaliense* should, perhaps, be excluded from the genus *Gossypium* because of its united stigmas. The two species are described. They have been crossed, artificially, with several other species at Shambat, near Kartoum.

1051. Tavares, H. 633.51:575.42(81)
Melhoramento do algodoeiro Mocó. (**Improvement of the Mocó cotton**).
Bol. Sec. Agric., Pernambuco 1944 : **11** : 7–12.
A method is outlined whereby Mocó cotton could be improved by selecting and intercrossing superior plants.

1052. Quintanilha, A., Cabral, A. and Quintanilha, L. 633.51:581.481:581.3
Abnormal female gametophytes in relation with polyembryonic seeds in Upland cotton.
S. Afr. J. Sci. 1947 : **43** : 158–66.
Descriptions are given of two cases of abnormal embryo sacs in the Upland cotton variety 9L36. In the first case of abnormality the embryo sac, which was examined before fertilization, contained two egg cells, four synergids and four polar nuclei, instead of the single egg cell, two synergids and two polar nuclei usually found. The antipodal cells, of which there must have been six, had degenerated as usual. The second embryo sac was examined after fertilization. Before fertilization it must have had the same constitution as the first embryo sac. When the two male nuclei entered the embryo sac, one must have fused with one of the egg cells, the other with one pair of polar nuclei, and the triploid endosperm mother cell must have begun to divide immediately. The ovule showed one fertilized and one unfertilized egg cell, two normal synergids, two synergids digested at the entrance of the pollen tube as normally occurs, the pair of polar nuclei not yet fused and the first two nuclei produced by the division of the endosperm mother cell. If this ovule had continued to develop it would probably have given rise to heterogeneous twin seeds, one diploid and the other a parthenogenetically developed haploid. It is thought that an abnormal embryo sac of the type described arises as the result of an extra division of the fourth surviving megaspore.

1053. Berkley, E. E. and Barker, H. D. 633.51:581.6:575(73)
What makes cotton good?
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 369–72.
The problems of breeding for quality in cotton are summarized with reference to the main results of investigations in the United States.

1054. Sen, D. L. 633.51.00.14(54)
Technological reports on standard Indian cottons, 1946.
Technol. Bull. Indian Cott. Comm. 1947 : Ser. A : No. 66 : Pp. 108.
The technological report for 1946 on standard Indian cottons follows the plan of previous years' reports (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 70 and XVII, Abst. 491). The results of fibre, yarn and spinning tests on each of the 19 standard varieties are reported in detail. Tables are also given summarizing the results of analyses of the fibre properties of the standard cottons for the years 1926–46, and the results of spinning tests during the period 1936–46.

1055. O'Kelly, J. F. 633.51.00.14(76.2)
Tests of cotton varieties for hill soils of Mississippi 1946.
Bull. Miss. Agric. Exp. Sta. 1947 : No. 442 : Pp. 7.
Cotton varietal trials carried out on the hill soils of Mississippi in 1946 are reported. The bulletin summarizes the results of tests conducted during the period 1942-46. The varieties and strains included Delfos strains, Empire, Miller, Deltapine 14, Hi-Bred, Stoneville 2 B and 5 A, Bobdel and other cottons.

1056. Neely, J. W. and
Brain, S. G. 633.51.00.14(76.2)
Cotton variety tests in the Yazoo-Mississippi Delta, 1943-45.
Bull. Miss. Agric. Exp. Sta. 1946 No. 435 : Pp. 12.
Performance data and money values per acre are presented for cotton varieties tested at various locations in the Yazoo-Mississippi Delta in 1946. Averages of results of two year tests are also given.

1057. Dick, J. B. and
Brain, S. G. 633.51.00.14(76.2)
Cotton varieties in the Yazoo-Mississippi Delta 1944-1946.
Bull. Miss. Agric. Exp. Sta. 1947 : No. 445 : Pp. 13.
A report is given of cotton varietal trials conducted during the period 1944–46 at various locations in the Yazoo-Mississippi Delta. The varieties included Stoneville 2 B, Deltapine 14 and 15, Bobdel, Miller, Delfos strains, Bobshaw, Wilds and Coker 100.

1058. 633.513:576.312.35
Tjio, J. H. 633.513:576.312.315
Notes on nucleolar conditions in *Ceiba pentandra*.
Hereditas, Lund 1948 : **34** : 204–08.
The somatic chromosome number in several specimens of *C. pentandra* of different origin was found to be 88. The size and morphology of the chromosomes are briefly indicated. It was noticed that large nucleoli nearly always persisted through metaphase and anaphase. Their behaviour during cell division is described. The division of the nucleolus and the movement of the daughter nucleoli to the poles may, it is thought, be due to the forces which according to Östergren's theory account for the spatial distribution of the chromosomes in metaphase plates.

1059. Spooner, H. A. 633.52(76.4)
Texas discovers flax.
Sth Seedsman 1948 : **10** : 16, 26, 30.
The article includes notes on the following flax varieties which are adapted in various parts of Texas: Maritime, Rio x Riza (Selection 12), Norsk, Turkey, Light Mauve and Rio.

1060. 633.52:575(48.5)
633.522:575(48.5)
Granhall, I. 633.854.54:575(48.5)
Lin och hampa. (**Flax and hemp**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 290–99.
The history of flax and hemp growing in Sweden is outlined up to 1938 when the Swedish Seed Association received a special government grant for intensive breeding and cultivation experiments with these crops and a flax laboratory was provided for quality tests with funds received from the state and industrial concerns.
Reports on yields in variety trials of fibre flaxes obtained by breeding have already been published in 1944 and 1946 (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 284).
Direct line selection of fibre flaxes has been applied to (1) a series of older Svalöf strains exhibiting a certain amount of variation, (2) some foreign populations, and (3) more heterogeneous commercial strains. In group (1) the old varieties, Nos 015, 029, 032, 036 and 041, are now replaced by new lines whose value is discussed in this paper. Sv 015 b_1 is of special interest and in 1945 was handed over to the Seed Company (Utsädesbolaget) for multiplication. Like Blenda, it was derived from an old Svalöf population, and resembles Blenda in plant type, but has yielded 10% more fibre, which is outstanding in quality when lodging does not occur. Sv 029 b_1 is a dual purpose flax which has given good yields of straw and seed, but has been less satisfactory as regards the fibre obtained. Selection among foreign heterogeneous material has not been successful: selections from the varied collection of Esthonian and other Baltic land varieties have all proved too weak in straw. Various other methods have therefore been applied to the breeding of fibre flaxes. Among the promising lines developed are Nos 0200, 0220, 0240, 0250, 0260 and 0261, whose origin and performance in tests are briefly reviewed.

More recent crosses that appear promising include: Herkules x Sorauer Lusatia (Germany), Herkules x Dolgunec 30 (Russia), (Herkules x 015) x Blauwe Ster (Holland), Blenda x Rota (Latvia) and (Herkules x 015) x Lyngby 30 (Denmark).
Tetraploid flaxes are being studied (cf. Abst. 720). Line 0800, a chlorina type of mutation obtained by X-rays, has surpassed its parent in yield of straw and given a very high yield of fibre.
The early history of linseed breeding is given.
New varieties in trials during 1940–45 have all been obtained by direct selection from heterogeneous material including commercial varieties from Irak and Argentina and land varieties from Studina, Rastu and Catalina in Rumania. Among the most recent material are some selections from linseed from Afghanistan and also some hybrid combinations. Some promising yellow seeded flaxes have also been obtained.
The pre-war collection of hemps obtained for breeding work included seed from Turkey, Hungary, America, Manchuria, some strains of which could not be maintained owing to late seed setting. Jugoslav, Italian and Rumanian hemps are being grown for seed in spatially isolated plots at Svalöf, and natural selection appears to be gradually increasing earliness though stem length is being adversely affected. The performance of some of these strains is mentioned. Hemp is being tried even as far north as Norrland, and strains grown there, especially the Kälarne-Schurig hemp, have ripened several days earlier when transferred to Svalöf, though at the same time the yield of stems has decreased and the seed yield has increased. This may possibly be due to degeneration of the Schurig strain after having been grown for seed for many years in Sweden.

1061. PUGSLEY, A. T. and HOCKLEY, S. R. 633.52:575(94.2) 633.854.54:575(94.2)
Flax varieties and flax breeding at the Waite Institute, 1943-1946.
J. Dep. Agric. S. Aust. 1947 : **51** : 65–70.

Flax investigations carried out at the Waite Agricultural Research Institute, South Australia, during the period 1943–46 are reviewed.
The results of trials of the following varieties are given: Liral Monarch, Liral Prince, Liral Crown, Concurrent, Giza Purple, Stormont Gossamer, Norfolk Earl and Wada.
Breeding objectives include the production of (1) rust resistant varieties, (2) varieties possessing vigorous early growth during the winter months, and (3) dual purpose varieties.
Several varieties have shown rust resistance, viz.: the Russian varieties, Stakhanovetz, D.83 and 806/3; Wade from Western Australia; and Cascade and Saginaw x Ottawa, introduced from the United States. The latter hybrid variety has been used in breeding, and hybrids involving this flax are now under test for yield and fibre quality.
The Egyptian variety Beladi is being used in breeding for improved vigour of early growth during the winter.
Selections of Liral Crown x Walsh x Liral Crown, and an unnamed hybrid derived from the cross Bison x Liral Prince and introduced from England, are under trial as possible dual purpose varieties. In straw and fibre yields the selections equal the fibre varieties; in seed yields they have surpassed the fibre varieties by 20%.

1062. 633.52–2.4:576.16:631.521.6:581.6:575(82)
KUGLER, W. F. 633.854.54–2.4:576.16:631.521.6:581.6:575(82)
El mejoramiento del lino oleaginoso y textil en la Argentina. (**The improvement of linseed and flax in Argentina**).
"Granos" Semilla Selecta, B. Aires 1947 : **11** : Nos 1–3 : 3–34.

This paper is a reprint of an article already reviewed in *Plant Breeding Abstracts* (cf. Abst. 340).

1063. 633.52–2.48–1.521.6(41.5)
633.854.54–2.48–1.521.6(41.5)
Twentieth Annual Report of the Agricultural Research Institute of Northern Ireland, Hillsborough, Co. Down 1946-47 : Pp. 32.

Investigations on flax included field tests of fibre and oil producing varieties and selections for resistance to *Polyspora Lini* and *Phoma* sp.; these field tests have now been completed. It has been found that while certain fibre varieties exhibit some degree of resistance to

Polyspora Lini all the varieties tested are susceptible to *Phoma*. A few oil producing varieties possess a considerable degree of resistance to both diseases but none show immunity.

1064. Rosbaco, A. M. de 633.52–2.7–1.521.6(82)
Linos "amargos." ("Bitter" flaxes).
Rev. Invest. Agric. B. Aires 1947 : **1** : 241–42.
Varieties Klein 11 and H39(A) are attacked preferentially by locusts when grown with Querandí M.A. and a selection of the Tezanos Pinto Experimental Station. When Querandí M.A. and the selection are grown alone, the former is attacked first.

1065. Giddings, N. J. 633.52–2.8:576.16:631.521.6(73)
Some studies of curly top of flax.
Phytopathology 1947 : **37** : p. 844. (Abst.)
Tests were carried out on the reaction of *Linum* species and varieties to strains of curly top virus. Some flax varieties appeared to be relatively more resistant than others. The various strains of the virus showed differences in virulence; strains 5, 6, 9 and 3 were highly virulent and resulted in a high mortality among the plants of most varieties. *L. Lewisii*, *L. perenne* and *L. flavum* showed outstanding resistance. *L. grandiflorum* var. *rubrum* appeared to be susceptible. No indication was obtained of species or varieties which would be valuable as a means of differentiating the strains of curly top.

1066. Crane, J. C. 633.524.3
Kenaf - fiber-plant rival of jute.
Econ. Bot. 1947 : **1** : 334–50.
A review is given of the results of investigations on the production of kenaf (*Hibiscus cannabinus* L.) begun by the United States Department of Agriculture at the beginning of the second World War, and of investigations in India and other countries. The article includes sections on the botanical characters of the kenaf plant, nomenclature, varieties, cytogenetics, the anatomy of the stem, adaptability, cultural requirements, fibre extraction and other topics. A useful bibliography of 53 references is appended.

SUGAR PLANTS 633.6

1067. Agete y Piñero, F. 633.61(72.91)
La caña de azúcar en Cuba. **(The sugar cane in Cuba).**
Estac. Exp. Caña Azucar, Minist. Agric. Cuba 1946 : **1** : and **2** : Pp. 602.
The first of these two volumes dealing with the sugar cane in Cuba includes extensive details of the history, genetic origin and characteristics of Cuban varieties.

1068. 633.61:575(72·9)
12th Annual Report of the British West Indies Central Sugar Cane Breeding Station, Barbados, ending September 30, 1945 : Pp. 45.
Progress in the selection of sugar cane seedlings belonging to the B. 42, B. 43, B. 44, B. 45 series is reported. A summary is also given of the select seedling trials and co-operative variety trials in different localities. The B.47 series of seedlings has been obtained as a result of hybridization carried out in 1944. In the production of this group, extensive use as parents was made of the Glagah nobilizations B.3337 and P.O.J.2878, the Celebes nobilization B.35197, the Chunnee nobilization B.37161, and varieties of mixed origin such as B.34104. Seedling progenies of crosses involving these varieties are particularly promising.

1069. Sartoris, G. B. 633.61:575(73)
New kinds of sugarcane.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 353–56.
A useful summary is given of sugar cane breeding investigations in the United States.

1070. Dillewijn, C. van 633.61:575:016
Sugar-cane breeding. A review.
Int. Rev. Agric. 1946 : **37** : T 85–125, T 141–92.
A comprehensive review is given of the literature on sugar cane breeding in various countries of the world. The survey chiefly deals with papers published before 1940. The preparation

at a later date of a further survey of more recent literature is intended. The bibliography includes 431 references.

1071. RAHEJA, P. C. 633.61:575.42:581.143.26(54)
Growth studies on *Saccharum officinarum* I. Varietal series.
Indian J. Agric. Sci. 1946 : **16** : 113–39.

Four years' study of the growth in length of sugar cane varieties as a criterion to be used in the early selection of suitable canes is reported. The data are treated statistically and their significance discussed. Underground branching and millable cane characters were also studied in one year.

1072. 633.61:576.312.35
BREMER, G. 633.61:576.356.5:575.127.2
De cytologie van soortsbastaarden bij *Saccharum*. (**The cytology of species hybrids of *Saccharum*).**
Vakbl. Biol. 1946 : **26** : 2–10.

For fifty years interspecific hybrids have been produced in Java in the search for resistance to mosaic (yellow stripe) and sereh. In 1921 P.O.J. 2878, a cane possessing an unusually high sugar content, complete immunity to sereh and a high degree of resistance to mosaic, was selected from the back-cross P.O.J. 2364; the latter was produced by crossing P.O.J. 100 x Kassoer with EK 28, Kassoer being a wild cane found on the slopes of Tjerimai.

Jeswiet in 1916 concluded that Kassoer is a natural hybrid between Zwart (Black) Cheribon (*Saccharum officinarum*) and the wild glagah (*S. spontaneum*); this conclusion is supported by the similarity to Kassoer of many artificially produced hybrids between these two species.

Cytological investigations were begun in 1919. These show that interspecific hybrids of *Saccharum* differ from those of other genera in certain peculiarities.

All cultivated clones belong to *S. officinarum*, are heterozygous and possess typical chromosome numbers of $2n = 80$ and $n = 40$. Warm dry weather may disturb meiosis, but in cool damp weather pairing of the chromosomes is practically complete. Some clones, however, despite regular meiosis, have sterile pollen; these are chosen as female parents in crosses as there is no chance of self-pollination.

Javan glagah (*S. spontaneum*) has chromosome numbers of $2n = 112$ and $n = 56$; these numbers were also found in varieties from Sumatra, Borneo and Soembawa. The Talahib cane from the Philippines and varieties from North Celebes were found to have $2n = 80$ chromosomes. Forms from Middle Celebes had $2n = c.\ 96$, and were presumably hybrids from varieties with haploid numbers of 40 and 56. A clone from Krakatou has 126 and one from Burma 96 somatic chromosomes. Indian varieties have chromosome numbers of $2n = 56$, *c.* 64 and 72. An Indian variety with $2n = 48$ has also been reported (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 1102). A study of varieties from many more regions should result in their classification into sub-species.

S. officinarum crosses easily with the Javan glagah cane (*S. spontaneum*), giving rise to fertile hybrids; 11,000 healthy seedlings have been obtained by selfing one arrow. In Kassoer and artificial hybrids $n = c.\ 68$ and $2n = 136\ [= (2 \times 40) + 56]$; the hybrids show a strikingly regular meiosis. Crossing Celebes glagah and cultivated canes gives hybrids with $2n = 120\ [= (2 \times 40) + 40]$; the same number was found in the Philippine canes Toledo and Hinds Special, which are probably hybrids between the cultivated cane and Talahib (*S. spontaneum*). Co. 205, a hybrid between Vellai (*S. officinarum*) and *S. spontaneum* ($n = 32$), also shows evidence of the occurrence of two sets of 40 chromosomes from *S. officinarum* and 32 from *S. spontaneum*, giving $2n = 112$.

This increased number of chromosomes is not limited to hybrids of *S. officinarum* x *S. spontaneum*, but occurs frequently; the breeding of P.O.J. 2878 ($2n = 119$) and P.O.J. 2875 ($2n = 110$) is given as an example. A programme of breeding varieties with high and even extremely high chromosome numbers has been organized, in the hope of obtaining clones with very high sugar contents.

The doubling of the chromosome number is not due to the absence of reduction division but results from the splitting of the chromosomes in the innermost tetrad cell in the development of the embryo sac, so that diploid and haploid embryo sacs are formed. Many

problems, however, remain unsolved. Although diploid egg cells must frequently occur no triploid forms of *S. officinarum* are known, although very many triploid hybrids exist. Possibly the triploid forms are not viable, or are dwarfs and thus rejected in selection; or possibly the diploid egg cell may develop parthenogenetically after fertilization with *S. officinarum* pollen. The latter possibility is discussed at some length, as is also the doubling of the chromosomes in the megaspore diad or tetrad, which is compared with that resulting from colchicine treatment. C. B

1073. Dillewijn, C. van 633.61:581.6
Sugar cane culture in Egypt.
Bull. Sug. Cane Expert, Istanbul 1947 : No. 2 : p. 55.
Yield data are presented for sugar cane varieties grown in Egypt. All but one of the varieties tested outyielded the present standard cane, P.O.J. 105, some of them giving increases of 30–50% in sugar. Notes on the characteristics of different varieties under Egyptian conditions are included.

1074. 633.61:581.6:575(69.82)
Chambre d'Agriculture de L'Ile Maurice. Rapport du président sur l'exercice 1946–47. (**Chamber of Agriculture of Mauritius. The president's report on the year 1946-47**).
Rev. Agric. Maurice 1947 : **26** : 188–217.
It is stated by P. Halais in a letter quoted here that the three new sugar cane varieties, M 165/38, M 63/39 and M 76/39 are inferior as regards sugar yield, having given an average extraction of 10·5% as compared with 12% by M 134/32 under the same conditions.

1075. Khanna, K. L. and
Sharma, S. L. 633.61:581.8:581.6(54.1)
Studies in the anatomy of sugarcane stalk. I. Chewing Canes.
Proc. Indian Acad. Sci. 1947 : **26** : 13–31.
The anatomical characteristics of the sugar cane stalk which give suitability for use as a chewing cane were analysed in three chewing varieties, viz. Saharanpur Paunda, Amritsar Paunda and Peshawar Paunda, in investigations at the Central Sugarcane Research Station, Pusa, Bihar.
The following characters affecting the hardness of the rind and core were analysed in sectors of cross sections of the stalks: the number, size and total area of the vascular bundles in unit areas of the rind and core; the number of parenchymatous cells in outer and inner unit areas of the rind, and in a unit area of the core; the thickness of the cells in the parenchyma at 0·6 mm. and 1·2 mm. from the epidermis, in the parenchyma of the core, and the sclerenchyma of the rind and core.
The varieties showed different developments of the various anatomical characters studied. The Amritsar Paunda and Peshawar Paunda varieties were hardest in the rind and core showing maximum development of all the anatomical features in these regions, respectively. The rind of Saharanpur Paunda was softer than that of Peshawar Paunda, since the poorer lignification of the parenchymatous tissue in the former more than compensates for its greater area of vascular bundles; in the latter variety a high degree of lignification of the parenchyma nullified the softness due to a smaller area of vascular tissue. The Saharanpur Paunda variety also had a well-defined thin rind which peeled off easily as a result of the rapid decrease in the thickness of the walls of the parenchyma.
The Saharanpur Paunda variety was considered to be the softest variety. It had the smallest number of parenchymatous cells per unit area and therefore the largest in size, since the size of the parenchymatous cells is inversely proportional to their number in a unit area. In the area of vascular bundles and lignification of the parenchyma and sclerenchyma Saharanpur Paunda was not significantly different from Amritsar Paunda at 5% level. The Saharanpur Paunda variety was therefore found to be most suitable as a chewing cane.
An appendix gives the characteristic features of a factory cane, a comparison being made between the anatomical characters of factory sugar canes and the three chewing varieties.

1076. MARTIN, J. P. 633.61–2–1.521.6(92)
Observations on the sugar industry in Fiji—1947.
Hawaii. Plant. Rec. 1947 : **51** : 119–36.
This article on sugar production in Fiji includes an account of the commercial varieties in use and their relative resistance to Fiji disease, downy mildew, leaf scald and other diseases.

1077. CROSS, W. E. 633.61–2.451.2–1.521.6(82)
La actuación de la Estación Experimental frente a la crisis producida por el "carbón" de la caña de Azucar. (**The action of the Experimental Station in face of the crisis produced by the smut of the sugar cane**).
Circ. Estac. Exp. Agric. Tucumán 1946 : No. 136 : Pp. 7.
Sugar cane varieties, principally Tucumán seedlings, immune or resistant to smut are listed.

1078. KREIBOHM DE LA VEGA, G. A. 633.61–2.451.2–1.521.6(82)
Situación actual de las variedades de caña de azúcar con relación a la plaga del "carbón". (**Present position of the varieties of sugar cane with regard to smut**).
Bol. Estac. Exp. Agric. Tucumán 1947 : No. 61 : Pp. 40.
Extensive details are given on the degree of susceptibility to smut shown by the sugar cane varieties grown at Tucumán. The Tucumán seedlings 630, 1118, 1245, 1854, 2668, 3528, 3723, 3950, 4356, 4401, 44441, 4570, 4836, 4989, 5027, 5304 and 6101 were graded as free from attack; the Tucumán seedlings 2613, 2645, 2651, 2683, 2701, 3734, 3875, 4505, 4874, 4933, 5142, 5217, 5220 and 5227, Co. 413 and C.P. 29/116 were only occasionally infested.

1079. KREIBOHM DE LA VEGA, G. A. 633.61–2.484–1.521.6(82)
Medidas de precaución contra la enfermedad de la caña llamada "pokkah boeng" o "mal de la escalera". (**Precautionary measures against the sugar cane disease called "pokkah boeng"**).
Circ. Estac. Exp. Agric. Tucumán 1947 : No. 140 : Pp. 12.
The disease known in Java as "pokkah boeng" caused by *Fusarium moniliforme* has appeared in Tucumán, Argentina. Notes on the varietal susceptibility of Tucumán canes are given.

1080. MARTIN, J. P. 633.61–2.8–1.521.6
Fiji disease of sugar cane.
Hawaii. Plant. Rec. 1947 : **51** : 103–18.
A general account is presented of the Fiji disease of sugar cane, with reference to the history, symptoms, transmission, economic significance and control of the disease. A useful list is included, giving the reaction to Fiji disease shown by a large number of the commercial and breeding canes of various countries; the list was supplied by the Bureau of Sugar Experiment Stations, Brisbane, Queensland.

1081. SUMMERS, E. M. 633.61–2.8–1.521.6(76.3)
Further results on reduction in yield of C. P. 34-120 caused by mosaic.
Sug. Bull. N.O. 1947 : **26** : 57–58.
Attention is drawn to the fact that under certain conditions the sugar cane variety C.P. 34–120 is susceptible to mosaic (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 247).

1082. MARTIN, J. P. 633.61–2.8–1.521.6(92)
The Fiji disease project in Samoa.
Hawaii. Plant. Rec. 1947 : **51** : 89–101.
A substation has recently been established at Vailoatai in Samoa to provide facilities for testing the resistance of Hawaiian grown sugar canes to Fiji disease. Information on the reaction of Hawaiian canes to Fiji and any other foreign disease is necessary for satisfactory quarantine procedure in Hawaii, where Fiji disease and certain other diseases do not occur. At present nine commercial varieties and promising seedling canes from Hawaii are under trial at the Samoan substation for Fiji disease resistance.

Six native canes are described, which are grown for eating purposes and which have shown freedom from Fiji disease; these canes have been collected and planted at the Samoan substation for experimental purposes.

1083. King, N. J. 633.61–2.8–1.521.6(94.3)
Fiji disease control by resistant varieties.
Cane Gr. Quart. Bull. 1947 : **11** : 30–32.

An account is given of the successful control of Fiji disease in certain areas of Queensland by the use of resistant sugar cane varieties. The chief resistant canes planted include C.P.29/116, Q.42, Q.47, Q.48, Q.49 and Co. 290.

1084. Khanna, K. L. 633.61.00.14(54.1)
Sugarcane in Bihar. 1. Varietal position with special reference to the procedure adopted in introducing new varieties.
Indian Fmg 1947 : **8** : 116–20.

A detailed account is given of the extensive testing of Coimbatore sugar cane varieties and locally bred canes carried out in Bihar under the co-ordination of the Bihar Sugar Cane Varieties Advisory Committee, prior to varietal introduction. The committee was formed in 1936. In North Bihar the varieties approved for general cultivation are Co. 313, Co. 513, Co. 395, Co. 508 and Co. 453. In South Bihar the approved varieties include Co. 313, Co. 513, Co. K32, Co. 453 and B.O. 11.

1085. 633.61.00.14:575(69.82)
17th Annual Report of the Sugarcane Research Station, Department of Agriculture, Colony of Mauritius 1946 (1947) : Pp. 56.

A number of crosses involving different *Saccharum* species have been made. First year trials are reported, and the results are presented of the testing of crosses in 1944 and 1945. Several varieties have been selected, on the basis of the second and third year trials, for further testing. The results of variety trials comprising varieties M165/38, M63/69 and M76/39 tend to show that M63/39 is superior to the other two varieties released. Field observations also indicated that M63/39 seems to be suited to almost all climatic conditions in the island.

Chlorotic streak occurred on varieties M165/38, M63/39 and M76/39 in several variety trials. Canes of the second generation of the six West Indian varieties B.3337, B.3439, B.4098, B.34104, B.37161 and B.37172 have been propagated for testing, and some stools set aside for breeding purposes.

Of five varieties included in an investigation of the effects of pre-treatment of cuttings with organo-mercurial compounds, M171/30, M165/38 and M76/39 gave a high increase in the number of shoots, when treated, and M134/32 and M63/39 a considerably less increase.

1086. 633.61.00.14–2.8–1.521.6(76.3)
Summers, E. M. and 633.61–2.48–1.521.6(76.3)
Abbott, E. V. 633.61–2.1–1.521.6(76.3)
Disease testing and initial seedling selection work at the Houma Station during 1946.
Sug. Bull. N.O. 1947 : **25** : No. 21 : 189–90.

On the basis of seedling tests of sugar cane varieties in 1946, C.P. numbers were assigned to 204 seedlings; these are to be tested further. C.P. 34–120 has proved a very good parent variety; seedlings from it have been, in general, vigorous, of good type and satisfactory in sucrose. It is proposed to release varieties C.P. 34/92, C.P. 36/19 and C.P. 36/183 in 1947. The resistance of commercial varieties to mosaic, brown spot, root rot, red rot and chlorotic streak as shown by the 1946 tests is outlined.

1087. Brandes, E. W. 633.62–1.524:575(73)
Progress with sugar sorgo.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 344–52.

Investigations were begun in 1941 in the United States with a view to developing sorgo varieties suitable as a source of sugar and by-products. Three lines of investigation were followed: (1) the introduction of breeding material from the Old World, particularly Africa; (2) the collection of available domestic varieties at Meridian, Mississippi, and the

study of crosses between domestic varieties; and (3) widespread trials of domestic sorgos. The crossing of promising large tropical sorgos with domestic varieties appears to be the method most likely to lead to success in developing sorgo for sugar production.

1088. STEHLIK, V. 633.63:575.31
Incidence du sectionnement de la betterave sur la formation des collets. (**The influence of the division of the sugar beet on the formation of the tops**).
Publ. Inst. Belge Amélior. Better. 1947 : **15** : 109–12.

The inheritance of burst and irregular tops in the progeny of beets with such tops which have been divided longitudinally is compared with the progeny of normal uncut beets, and the data are interpreted as indicating that the cutting of the beets induces gene mutation.

1089. ERNOULD, L. 633.63:576.356.5:581.04(49.3)
Croissance comparée de betteraves sucrières diploides et tétraploides. (**Compared development of diploid and tetraploid sugar beets**).
Publ. Inst. Belge Amélior. Better. 1947 : **15** : 113–16.

Triploid and tetraploid plants of *Beta vulgaris* were obtained by colchicine treatment. The progeny of the tetraploids, which were fertile and stable, is compared with diploids of the same variety and with *B. maritima.*

1090. ERNOULD, L. 633.63:576.356.5:581.04(49.3)
Obtention de polyploides de l'espèce "*Beta patellaris*". (**Polyploids of *B. patellaris*).**
Publ. Inst. Belge Amélior. Better. 1947 : **15** : 117–18.

Triploids and fertile tetraploids of *B. patellaris* were obtained by colchicine treatment. They are briefly described.

1091. BOONSTRA, A. E. H. R. 633.63:581.1:575(49.2)
Het physiologisch werk aan het Instituut voor Plantenveredeling te Wageningen. (**The physiological research at the Wageningen Institute of Plant Improvement**).
Vakbl. Biol. 1941 : **22** : 181–86, 197–99.

Since 1931 the author has advocated the adoption of physiological research methods for purposes of plant breeding. This paper gives the practical results so far achieved in this field in the Wageningen Institute.

By means of field experiments with the sugar beet variety Kuhn P it was attempted to find out whether a plant giving the best end results had also started life under particularly favourable conditions. Special experiments, involving two varieties of sugar beet, were carried out in order to obtain comparative data of performance under three different degrees of soil moisture. The fluctuations of nitrogen content in plants were studied in detail by means of a new graphic method taking account of absolute quantities.

Of the two inbred varieties tested Kuhn A and Z, A had a higher sugar yield and produces more dry matter. Other experiments proved that varieties with a greater root activity produced more foliage and more dry matter. This is due to varietal and not to environmental factors.

Methods preventing the bolting of sugar beets are discussed. New methods in plant breeding may bring about a higher yield, without the necessity of increasing the amount of fertilizers used. The selection of plants showing little tendency to bolting and varieties developing quickly after sowing are indicated as promising lines of research. E. M. F.

1092. ARTSCHWAGER, E. 633.63:581.162.51
Pollen degeneration in male-sterile sugar beets, with special reference to the tapetal plasmodium.
J. Agric. Res. 1947 : **75** : 191–97.

Pollen abortion in the anthers of sugar beets, which are characterized by cytoplasmically inherited male sterility, is associated with either a tapetal plasmodium or cellular tapetum. The flowers of a single cluster may exhibit both types of abortive microsporogenesis, but within a given flower only one type is found. In semi-male-sterile sugar beets, possessing the same type of cytoplasm as the completely male-sterile sugar beets but differing from

the latter in one or more Mendelian factors, considerable variation in the expression of the semi-male-sterile condition was observed. Environmental conditions apparently have a marked influence on this type of male-sterility. Some anthers are affected so completely that even the anther wall is destroyed, whereas other anthers of the same flower are almost normal. In some anthers the tapetal cells are so radially enlarged that the anther cavity is occluded; these cells have large round nuclei and vacuoles resembling those observed in the plasmodium form in one type of complete male-sterility. The microspores within such anthers show various stages of degeneration ranging from a nearly normal condition to advanced pycnosis. The formation of plasmodia was not observed in the semi-male-sterile sugar beets studied.

The anatomy of anthers from plants possessing a non-cytoplasmically inherited type of male-sterility was also investigated. In this type, degeneration of the microspore appears to be delayed. The anthers have a mature endothecium with well-developed fibrous wall thickenings. The tapetum of such anthers remains cellular, and the cells composing it greatly enlarge.

The possible causes of the development of the plasmodium are discussed.

1093. STEHLIK, V. 633.63–2.484–1.521.6:575.127.2(43.7)
Essais de croisement de betterave sucrière avec *Beta trigyna*. (Crossing experiments of the sugar beet with *B. trigyna*).
Publ. Inst. Belge Amélior. Better. 1947 : **15** : 103–08.

B. vulgaris, *B. trigyna* and *B. maritima* are compared. From numerous crosses between *B. vulgaris* and *B. trigyna* a single apparent hybrid was obtained. This plant and its progeny are described. Crosses between *B. trigyna* and F_3 plants were not successful. Some of the above-mentioned hybrids and some *B. vulgaris-B. maritima* hybrids were resistant to *Cercospora*.

1094. HULL, R. and WATSON, M. 633.63–2.8–1.521.6(42)
Factors affecting the loss of yield of sugar beet caused by beet yellows virus. II. Nutrition and variety.
J. Agric. Sci. 1947 : **37** : 301–10.

A section of this paper reports the results of tests of commercial sugar beet varieties, breeder's lines and single plant progenies for their reaction to yellows virus in field plots colonized by infective aphids. The field experiments were carried out at Hackthorn, Lincolnshire, and Rothamsted Experimental Station, Harpenden. The nine single plant progenies tested had been selected at the Cambridge Plant Breeding Institute; the breeder's lines used were supplied by the Hilleshög Sugar Beet Breeding Station, Norwich. It was found that the different commercial varieties and types, selected lines and single plant progenies showed little variation in their reaction to the virus. Counts made in the variety trials conducted by the factories confirmed this result. None of the material investigated showed any promise of being suitable for breeding resistant or immune varieties.

1095. CARSNER, E. and OWEN, F. V. 633.63–2.8–1.521.6:575.42(73) 633.63:575.125(73)
Saving our sugar beets.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 357–62.

An account is given of sugar beet breeding for curly top resistance by the method of mass selection, and the various possibilities offered by the use of pedigree hybrids. Production of the latter has been made possible by crossing highly self-fertile lines and male-sterile lines. The development of the sugar beet seed industry is also outlined.

1096. DECOUX, L. 633.63.00.14(49.3)
Rétrospective des recherches agronomiques effectuées à l'Institut de la Betterave à Tirlemont de 1939 à 1946. (Retrospective of the agronomic investigations carried out at the Sugar Beet Institute, Tirlemont, from 1939 till 1946).
Publ. Inst. Belge Amélior. Better. 1947 : **15** : 49–54.

Field tests on beet varieties in the last few years show relatively less leaf production in large-topped and more in small-topped varieties. The classification of varieties according

to their industrial quality and their economic value to the planter differs from that based on yield of elaborated sugar per ha. Small-topped varieties are stated to be less resistant than large-topped ones to various diseases. A study of the variability of varieties revealed no great difference between the coefficients of variation for different varieties and showed that the coefficient of variation of sugar content was small as compared with other characters investigated.

1097. Simon, M. 633.63.00.14–2.6–1.521.6:575.42(49.3)
Développement actuel et perspectives des mesures de lutte contre le nématode de la betterave. (**Present development and prospects of control measures against the sugar beet eelworm**).
Publ. Inst. Belge Amélior. Better. 1947 : **15** : 77–91.

Work on the reaction of different varieties of *Beta vulgaris* L. to *Heterodera Schachtii* A. Schmidt and on selection for resistance is reviewed. The results are poor as compared with those of similar research on other crops, and it is concluded that resistance of the sugar beet to eelworm is very difficult to obtain.
Races of *B. maritima* and their hybrids with *B. vulgaris* varieties have proved susceptible. *B. procumbens* Smith and *B. patellaris* Moquin are resistant, however. Three fertile hybrids have been obtained by crossing the former with the sugar beet variety Klein-Wanzleben. Out of the 25,000 F_3 plants 10% showed little or no infection.
Artificially induced polyploidy in the variety Hilleshög has not increased its resistance. Induction of polyploidy in other *Beta* species is in progress, and the eelworm resistance of these polyploids and of interspecific hybrids will be studied.

1098. 633.682:575.12(54.8)
Koshy, T. K. 633.682:581.04:576.356.6(54.8)
The tapioca plant and methods for evolving improved strains for cultivation.
Proc. Indian Acad. Sci. 1947 : **26** : 32–59.

The work of developing improved strains of tapioca (*Manihot utilissima*) at the Tapioca Research Farm of the University of Travancore is described in detail.
Description of the botanical characters of the tapioca plant and of the anatomy of the stem and tubers are given.
Indigenous varieties of tapioca in Travancore have been classified on the basis of (1) the colour of the stem, petiole and tuber, (2) growth habit and (3) flowering or non-flowering habit. The paper presents the scheme of classification as applied to registered tapioca varieties.
Breeding includes intervarietal hybridization within *M. utilissima*, interspecific hybridization between *M. utilissima* and *M. Glaziovii*, and the production of polyploids of *M. utilissima*. The genetical behaviour of cultivated tapioca varieties when selfed is also being studied.
Pre-treatment consisting of soaking the seeds in water for a week at a constant temperature of 37° C. was found to be a satisfactory method of hastening germination in breeding investigations.
Promising lines obtained from intervarietal crosses within *M. utilissima* are under selection. The cross between *M. utilissima* and *M. Glaziovii* was only successful when the former species was used as the female parent. All the hybrids have flowered but plants derived from two varieties of tapioca only produced sterile male flowers. In their external appearance the hybrids differ markedly from either species. The nodal protuberances of the tapioca stems are absent, although the leaf scars are pronounced; the colour of the stem usually resembles that of the tapioca parent. The first few leaves of the plant are more like those *M. Glaziovii* than those of tapioca; with continued development of the plant, however, the leaves more closely resemble those of tapioca.
Two of the hybrids have been back-crossed with a number of tapioca varieties, the hybrids being used as male parents. A few back-cross plants which are either non-flowering or self-sterile have been obtained. It is suggested that the economic importance of developing sterile varieties of a vegetatively propagated plant such as tapioca should be investigated. Only one seed was secured as the result of 100 attempted self-pollinations of the hybrids.

Use was also made of the two hybrids as female parents in back-crossing; a number of seeds were produced. It is considered that interspecific hybridization and back-crossing will provide valuable selections.
Colchicine induced forms, presumed to be polyploids in the absence of cytological tests, have been obtained in several varieties; one of these polyploids has been crossed as female parent with four varieties in an attempt to obtain triploids.
In a study of the behaviour of four varieties when selfed, all the progenies showed marked segregation for leaf form and other characters.
The paper also includes a table summarizing the results of the chemical analysis of tubers from 27 tapioca varieties and selections. Three out of the six samples with the highest content of hydrocyanic acid were polyploid forms. The data suggest a probable correlation between rind thickness and hydrocyanic acid content in polyploid tubers.

STIMULANTS 633.7

1099. Rogoziński, A. 633.71:575(43·8)
O uprawie tytoni cygarowych. (**The cultivation of cigar tobacco**).
Wiadom. Tyton. Warszawa 1946 : **2** : 6–7.
The cigar tobacco variety Debreczyński of Hungarian origin but acclimatized in Poland is mentioned; also a valuable new broad-leaved variety Puławski, with some characteristics of a cigar tobacco, and classified as an intermediate type between cigar and cigarette tobacco. E. W.

1100. 633.71:575(43.8)
Rogoziński, A. 633.71–2–1.521.6(43.8)
Z postępu hodowli tytoniu. (**Progress in tobacco culture**).
Przegl. Uprawy Tyton. Puławy 1939 : **6** : 213–14.
American tobaccos were studied including varieties from seed obtained directly from U.S.A. and varieties acclimatized and selected in Poland. A variety, Kentucky 3002, grown for some years at Puławy is quite severely attacked by many diseases. When Kentucky was crossed with a variety of cigar tobacco, Szamoszaty 50/3, the hybrid had a relatively high resistance. This hybrid and another from Kentucky crossed by selection 16 of Szamoszaty 50/3 showed only 38% and 17% respectively of plants infected by white variegation and brown bacterial disease, whereas other American varieties were highly susceptible, Mammoth Gold for example showed 100% of infected plants. Ring spot and veinal necrosis also produced only weak symptoms in the case of the above two hybrids, whilst the American varieties were severely diseased. E. W.

1101. Benincasa, M. 633.71:575(45)
Miglioriamo i nostri tabacchi. (**Let us improve our tobaccos**).
Tabacco 1947 : **51** : No. 578 : 12–16.
An account is given of the early difficulties in the introduction of tobacco cultivation in Italy, followed by notable success after the work of the tobacco research station at Scafati was started in 1895. The result was that in 1941 some 45,760 ha. of tobacco were cultivated in Italy. It is pointed out that the public taste is moving away from the old cigar types towards the type of the blended American cigarette and that new problems for the plant breeder are thereby arising.

1102. Tedin, O. 633.71:575.12(48.5)
Tobak. (**Tobacco**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 316–17.
No success can be expected from indigenous tobacco growing in Sweden, and since 1941 and 1942 many foreign varieties have been raised, including two groups of particular interest, namely, Burley and various Havana types. Both types give satisfactory yields if the weather is favourable, but if not, the seed from Burley fails to ripen and the leaves also do not attain proper maturity. The Havana types grow vigorously but are sensitive to low temperatures and even at about + 4° C. the leaves appear frost bitten.
In 1941 and 1942 crosses were made with Judy's Pride and Station Standup Burley and Havana 236 on the one hand and the local Swedish varieties Tofta, Per Pers, and Fjälkinge

on the other, and in 1943–44 selections were made among these hybrids for vigorous plants with a leaf as light coloured, or nearly as light as that of the foreign parents, and also for earliness. In 1945 about 400 F_3 and F_4 lines from these crosses were raised, and it would seem that light coloured leaf has been successfully combined with low heat requirement, as most of the selected lines showed normal development, whereas the foreign varieties, especially Burley, were severely retarded. Renewed selection of the most promising lines may, it is hoped, fix the desirable characters.

How far the improved leaf colour may bring with it improved quality has still to be ascertained. Even a small improvement in quality should make it possible to use Swedish produced leaf for mixing in the commoner and cheaper brands of pipe and cigarette tobacco. The Swedish Tobacco Monopoly has defrayed the expense of a well fitted-up drying chamber for the curing of samples from breeding material which must be tested for quality.

1103. Cieślicki, Z. 633.71:575.42(43·8)
Znaczenie selekcji odmian tytoniu. (The importance of selection of varieties of tobacco).
Przegl. Uprawy Tyton. Puławy 1936 : **3** : 136–37.

Seed of the tobacco variety Węgierski Ogrodowy [Hungarian Garden], obtained from Hungary, proved to be a mixed population. In 1930 at Jagielnica, Poland, a series of types of plants was isolated differing from each other in form, foliage, ripening time, resistance to disease and even nicotine content. From some of these types new lines were obtained, one of which, No. 34, when compared with the original population, showed higher yields, greater resistance to bacterial disease and good drying properties; the number of leaves per bush was also considerably higher and the leaf form was good being more like that of cigarette tobacco, in contrast to some of the earlier ripening types first isolated which had resembled cigar tobacco.

Seed of the variety Tyk-Kułak of Russian origin did not produce very characteristic types of this variety in Poland, but one line No. 91 selected at Puławy proved satisfactory under Polish conditions, though not so good as another, line No. 88, which had been selected in 1932. Further experiments confirmed the value of line 88 even on different kinds of soil. In 1934 when tested under relatively unfavourable conditions for tobacco, line 88 again showed its superiority in yield, percentage of bright leaf, and body and elasticity of leaf, and generally resembled the variety Trebizond. E. W.

1104. Clayton, E. E. 633.71–2–1.521.6:575(73)
New kinds of tobacco.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 363–68.

Tobacco breeding for disease resistance in the United States is reviewed.

1105. Perucci, E. 633.71–2.484–1.521.6(45)
Il "Resistente 142". (The variety Resistente 142).
Tabacco 1947 : **51** : No. 579 : 14–18; 1948 : **52** : No. 582 : 16–23.

The Wisconsin variety Root-rot Resistant Havana No. 142, known in Italy as Resistente 142, has proved well adapted to the more humid tobacco growing zones of Italy. Indications are given of the areas most suitable for it and the best methods of cultivation.

1106. 633.71–2.8:576.16:631.521.6
Johnson, J. 632.8:575.243:581.036
Virus attenuation and the separation of strains by specific hosts.
Phytopathology 1947 : **37** : 822–37.

Using single-lesion pure line strains of tobacco mosaic virus, inoculation experiments were carried out on *Eryngium aquaticum* and the tomato. Naturally infected *Eryngium* plants invariably yielded a mild or attenuated strain of tobacco mosaic virus. The results of inoculation experiments demonstrated that this attenuation was due to the separation of severe and mild forms of the virus by the host; the mild strain became systemic and the severe strain was localized in the inoculated leaves. In the case of the tomato the reverse process of separation occurred. The severe strain became systemic, but the mild strain could not be recovered from either non-inoculated or inoculated leaves, indicating that the plants used were immune to this strain.

In leaf wiping tests of reaction to both strains, the Daruma variety (*Nicotiana Tabacum*), *N. sylvestris*, *N. longiflora* and the F_2 of a cross between *N. longiflora* and *N. Tabacum* (Clayton's T.I. 106) produced good necrotic local lesions only with the mild strain. This behaviour should prove valuable in the identification of mosaic virus strains.
Mutation was induced in the single-lesion pure line strains of tobacco mosaic virus, which normally remain constant, by allowing multiplication of the virus to occur at a temperature of 35°–37° C. By this method both attenuated and entirely new strains were produced; some of these new strains gave more severe symptoms in tobacco that the original severe strain.

1107. SCHREIBER, G. 633.73:576.356.5
Estudo cariométrico dos poliplóides de Coffea. (**Caryometric study of the polyploids of *Coffea*).**
Bragantia, São Paulo 1946 : **6** : 279–97.
Nuclear volume in a polyploid series ($2n = 22$, 44, 66 and 88) of *C. arabica* was found to be proportional to the chromosome number. The nuclear volume of *C. congensis*, however, with $2n = 22$ chromosomes corresponded to that of a triploid representative, $2n = 33$, of *C. arabica*.

1108. 633.73:581.163:576.356.5
MENDES, A. J. T. 633.73:575.127.2
Partenogênese, partenocarpia e casos anormais de fertilização em *Coffea*. (**Parthenogenesis, parthenocarpy and instances of abnormal fertilization in *Coffea*).**
Bragantia, São Paulo 1946 : **6** : 265–73.
Diploid, hexaploid and octoploid plants have been obtained among the progeny of the tetraploid species *C. arabica* ($2n = 44$). The diploids presumably arose parthenogenetically, the hexaploids and octoploids from non-reduced gametes or by chromosome duplication. The diploids gave rise mainly to tetraploid plants and a few aneuploids; when crossed with a tetraploid, a tetraploid progeny was produced. The progeny of the hexaploids included tetraploids and a few aneuploids. When the hexaploids were crossed with a tetraploid, tetraploid, pentaploid and aneuploid plants resulted. The progeny of the octoploids included tetraploids with some hexaploids and octoploids.
Hybrids of *C. arabica* and *C. canephora* ($2n = 22$) included not only triploids, but also diploids and tetraploids.

1109. VOELCKER, O. J. 633.74–1.521.6:575:631.524(66)
The West African Cacao Research Institute.
Nature, Lond. 1948 : **161** : 117–19.
Past research on diseases of cacao and the work of the West African Cacao Research Institute are discussed. A valuable collection of *Theobroma Cacao* varieties and several other *Theobroma* species has been established at Tafo.

1110. GARCES O., C. 633.74–2.472.3–1.521.6(8)
La escoba de bruja del cacao. (**Witches' broom of cacao).**
Rev. Fac. Nac. Agron. Colombia 1946 : **6** : 329–69.
The literature in which resistance of cacao varieties to *Marasmius perniciosus* is reported is reviewed. The following resistant forms are noted: a form of Calabacillo cacao from Ecuador known as Cojón de Toro; the Forastero variety Zambo introduced into Ecuador from Venezuela; a hitherto undescribed variety from Ecuador known as No. 5, claimed to be of superior quality to Calabacillo and Zambo; the variety Soconusco; some trees of the variety Venezuela, possibly introduced into Ecuador from the Amazon Basin according to Pound; 14 trees growing by the Nanay river in the Amazon valley; occasional trees of the variety Lagarto; and the Pará cacao of Belem, Brazil.

1111. BURGESS, A. H. 633.79:061.6:575(42)
New hop research centre at Wye College.
J. Inst. Brew. 1947 : **53** : p. 227.
A note is given on the Hop Research Centre recently established at Wye College, Kent, to investigate problems of soils, cultivation, varieties, breeding, diseases, brewing qualities,

and the drying and storage of hops. The centre is to be administered by Wye College. The Ministry of Agriculture, the Hops Marketing Board and the Institute of Brewing are providing grants for the maintenance of the centre; the last two named are bearing the capital costs of the foundation of the centre. Close co-operation with the investigations on hop diseases at the East Malling Research Station will continue.

1112. GRANHALL, I. 633.79:575(48.5)
Humle. (**Hops**).
Sverig. Utsädesfören, Tidskr. 1946 : **56** : 318–19.

Two milestones in the history and development of hop production in Sweden are the collaboration established in 1913 between the breweries and the Swedish Seed Association, and the considerable increase in financial support in 1945 on the part of the Association for Swedish Hop Cultivation [Forening för Svensk Humleodling], representing the brewing industry.

As a result of the work of N. Sylvén and of G. Nilsson-Leissner, who were originally in charge of hop breeding at Svalöf, the strain Sv 85 was obtained by selection and planted out in 1946 in the special hop district of Näsum. It ripens 10–14 days before the popular Saazer strain, gives a good yield and has a high content of bitter substance. Brewing tests with the 1945 harvest have given outstanding results.

The future programme in breeding aims at more strains that are earlier than Saazer and also of high quality. Growers would require at least three varieties that will ripen in succession, so that the picking season can be extended.

The central laboratory of the brewing industry, at Stockholm, is conducting analyses of the breeding material from the point of view of bitter substances and other factors of quality. Observation plots of Saazer and Sv 85 are being laid down by the Swedish Seed Association and the Association for Swedish Hop Cultivation at various centres in addition to Näsum.

1113. 633.79:581.45:575.1
633.79:575"793"
HOCQUETTE, M. 633.79:581.192:575.1
Considérations sur la transmission de divers caractères dans des croisements de races cultivées de houblon. (**Considerations on the transmission of various characters in the crossing of cultivated races of hops**).
Bull. Soc. Bot. Fr. 1946 : **93** : 24–28.

Hybridizations were effected between the Flanders hop, Tige Verte [Green Stem] or Beuvrines, used as male parents in each case, and the Lorraine varieties Précoce de Lorraine (Lorraine Early), Tardif de Lorraine (Lorraine Late), the Alsatian varieties, Strisselspalter and Sämling I, the English varieties, Fuggle, Tolhurst, Colgate, Tutsham and Bramling, and the Czechoslovakian varieties, Zatek and Ustek. These female parents and the hybrids derived from the crosses were grown together with female Tige Verte plants under identical conditions. A study of the type of wood and arrangement of vascular bundles in the petiole of the parents and the inheritance of these characters by the hybrids leads to the conclusion that the parents are heterozygous for the factors involved. The chemical composition of the parents and hybrids is also compared. It is deduced that the loose type of wood in the petiole is dominant to the compact type, that the U-shaped arrangement of the vascular bundles of the petiole is dominant to the semi-circular arrangement and that lateness is dominant to earliness and, further, that there is no linkage between the genes governing these characters. The author concludes that the results described support the contention that the cultivated hops, at least those investigated by him, have been produced by the vegetative propagation of hybrids.

1114. FLETCHER, L. and
McLINTOCK, R. P. 633.79:581.6(410 + 41.7)
Brewing trials with four new varieties of hops raised by Prof. E. S. Salmon at Wye College, Kent; 1946 growths.
J. Inst. Brew. 1947 : **53** : 249–50.

The results of brewing trials on the new hop varieties, WFG 19, WFB 117, WFI 36 and WFC 69 are tabulated. Varieties WFG 19 and WFI 36 were derived from the cross

Canterbury White bine x the male seedling OB 21 raised from Brewer's Gold (C 9a). WFC 69 is a seedling of Bullion Hops (Q43). WFB 117 originated from a cross between seedlings of seedling II 149 derived from Brewer's Gold.

1115. SALMON, E. S. 633.79.00.14(42)
Twenty-ninth report on the trial of new varieties of hops 1945.
East Mall. Res. Sta. 1946 : Pp. 14.

The 1945 trials of new hop varieties originally developed at Wye College, Kent, are reported. Information is given on the origin of the new varieties, yields of green and dried hops, chemical composition, and resistance to downy mildew.

1116. SALMON, E. S. 633.79.00.14(42)
Thirtieth report on the trial of new varieties of hops 1946.
East Mall. Res. Sta. 1947 : Pp. 16.

The results of the 1946 trials of new hop varieties developed at Wye College, Kent, are summarized under the sections given in previous reports (cf. Abst. 1115).

CONDIMENTS 633.84

1117. GREENLEAF, W. H. 633.842:575(75.8)
Line breeding as a method of improving the pimiento pepper.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 224–26.

Plants were selected from the Truhart Perfection pepper (*Capsicum frutescens*) at the Georgia Experiment Station, the following characters forming the basis of selection: fertility, as shown by the number of large, medium and small pods; earliness; the length x diameter of one or more pods; the thickness of the pod wall; vigour, as shown by plant height; and habit. Other characters, such as reaction to mosaic, were also noted. The lines obtained by selfing these original selections showed significant differences in mean yields and plant height. The lines have been selected, and twice-selfed seed has been secured. Selection is also being carried out on plants from additional seed sources.

The possibility of loss in vigour due to inbreeding and the utilization of heterosis in pimiento pepper is discussed, in view of the fact that the crop undergoes a certain amount of natural cross pollination. It is thought heterosis may be important, and the suggestion is made that inbred lines should be selected on the basis of plant vigour, fruit size and high yielding capacity. Crosses could then be made between the highest yielding inbred lines, which would serve as a source of further improved inbred lines. The most promising inbred lines or their hybrids could be commercially released at intervals. In conjunction with this breeding method genes for disease resistance found in other varieties of pepper could be transferred to the new strains by back-crossing.

1118. GREENLEAF, W. H. 633.842:576.356.5(75.8)
A spontaneous tetraploid hybrid in pepper (*Capsicum frutescens*).
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 231–32.

The natural occurrence of a tetraploid in the F_1 of the cross Pimiento x Santanka is reported. The tetraploid nature of the F_2 generation produced from the F_1 parent plant was demonstrated by (1) the tetraploid segregation ratios obtained for the characters hot fruit versus sweet fruit and determinate versus indeterminate habit; (2) approximate chromosome counts at metaphase II in pollen mother cells; and (3) the reduced seed set in comparison with that of the corresponding diploid population.

The tetraploid occurred in a wide intraspecific cross, and it is suggested that partial allotetraploid pairing may occur. It is believed that the tetraploid F_1 plant was probably the result of chromosome doubling at the first zygotic division.

The tetraploid form appears to have no economic significance. The tetraploids showed no advantage in vigour over the diploids and their fruit set was less.

1119. INGALLS, N. M. 633.842:581.6(73)
King of the North pepper.
Horticulture 1944 : **22** : p. 181.

King of the North is described as a giant, early pepper suitable for growing in gardens in Northern U.S.A. The fruits are sweet and mature 65 days after the plants are set out.

The yield is heavy, the peppers, which are often five to six inches long and three to four broad, being borne down the whole length of the 22 inch plants. They are a glossy, dark green, turning bright red when ripe.

1120. Silva, J. J. Ferreira e 633.842.00.14(46.9)
A cultura do pimenteiro destinado à indústria do pimentão moído. (**The cultivation of red pepper for the ground pepper industry**).
Minist. Econ. Estud. Inform. Técn. Portugal 1946 : No. 30 : Pp. 46.
Yield trials of five Portuguese varieties of red pepper are reported.

OIL PLANTS 633.85

1121. Andersson, G. 633.853.49:575(48.5)
Oljeväxter. (**Oil crops**).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : 300–08.
The past history, and recent advances and successes in oil crop variety trials and breeding in Sweden are surveyed, mention being made of the varieties, Svalöfs Primraps, Svalöfs Senraps, both derived from the Börringe strains in widespread use during 1918–21, and the German winter rape, Lembke's.
The aim in breeding has been to increase the yield of oil per ha. by increasing seed yield, per ha. and oil content of seed. Modern methods are being applied to oil crop breeding, including breeding for transgressive characters, induction of polyploidy followed by selection and crossing, and interspecific crossing with turnip rapes.
Obtained by simple selection from Sv. Senraps, Elite B, showing increased yield of seeds has been put on the market in 1945. Strains have also been obtained with higher yield and oil content from a cross of Senraps with Lembke's rape.
Unfortunately, in the available collection of winter rape, variation is not very great in regard to the important characteristic of cold resistance: it is therefore important to try by interspecific hybridization to transfer the factors for hardiness from winter turnip rape to winter rape. The latter also stands later sowing, another feature which it would be desirable to introduce into winter rape. Efforts are also being made by hybridization with earlier European rapes to obtain forms characterized by earlier flowering, as a means of avoiding pest attack in the bud and early flowering stages. Some success seems possible. Whether resistance or susceptibility to insect pest damage is hereditary is a further problem for the breeder. It seems probable that varietal differences may exist in the capacity to form new shoots and buds after insect damage. No progress has yet been made in breeding to decrease the tendency of the seed pod to open on ripening and field drying.
The cultivation of winter turnip rape in Sweden began in 1944 with the release of the variety of Sv. Rapido to the market (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 873). In addition to superior frost resistance and later sowing time as compared with winter rape, the turnip rape does not need such good soil and is earlier in development and thus escapes pest attack and fits in better with farming practice.
Present breeding aims are a more hardy winter turnip rape for central Sweden and another variety suitable for southern Sweden, where yield will be the most important characteristic. Rapido meets the requirements regarding pest resistance but it is hoped to increase the yield without lowering the frost resistance much by crossing with Lembke's turnip rape. To obtain varieties for southern Sweden vigorous plants from Lembke's winter turnip rape are being crossed with Rapido to shorten, if possible, the vegetative period and induce early flowering.
Spring rape is represented by the Swedish variety Svalöf Regina, obtained by mass selection from a Danish commercial strain Lyngby which it surpasses in uniformity of growth habit and higher yield. It is still not uniform enough in its developmental rhythm and grows slowly, and is therefore subject to severe attack by pests in the seedling stage and at flowering. It is hoped to remedy these defects.
The irradiation technique is being used as well as selection from land varieties and hybridization, and a line Sv 44/107, now being multiplied and obtained by irradiation of Regina, is earlier, flowers more rapidly and evenly and grows more quickly in the seedling stage. It has also given higher yields than Regina and seems to have a higher oil content.

Crosses are also being made of spring with winter rape and also with spring turnip rape to obtain increased yield and faster growth and flowering.
Spring turnip rape has been crossed with spring rape to increase its yield.
Brassica juncea and *B. nigra* are also being studied for their theoretical interest in relation to the breeding of rape and turnip rape.
White mustard breeding is proceeding with Scandinavian, English and German commercial strains and a few improved varieties without, however, any marked success so far. Induced mutation by X-irradiation and polyploidization are also being tried and high chromosome lines have been obtained in which the pods are less prone to open at maturity.
Poppy breeding has resulted in the production of some new lines that are higher yielding than Mahndorfer and have stiffer and less brittle stems than Peragis.
Hybridization with white seeded varieties seems a promising method of increasing oil content.
Investigations are also being made to find out whether varietal differences exist in resistance to *Pleospora* and *Peronospora*.
Sunflowers are being bred for earliness, high yield of seed and oil, shorter stems and less fleshy discs that can be field-dried in Sweden.
Other oil plants being studied are safflower, *Crambe* and *Madia*.
Soya bean is more important in Sweden as a source of protein than for oil. Work at Svalöf up to 1944 has been recorded in *Plant Breeding Abstracts*. By breeding earlier maturity has been achieved in some of the experimental material and even lines characterized by improved yield, seed quality and resistance to virus and other diseases have been evolved. Some mutations of value have been obtained by X-irradiation, though advances in this field have not been so evident as those attained by hybridization.

1122. Leggieri, L. 633.853.55:575(45)
Razze di ricino sanguigno ottenute per selezione. (**Races of *Ricinus sanguineus* obtained by selection**).
Ann. Fac. Agr. Portici Univ. Napoli **1943–46** : **15** : 175–86.

The five botanical varieties of *R. communis* are described; var. *sanguineus* as cultivated in Italy proved very mixed and in 1937 selection was begun for types with a restricted ripening period, freedom from disease and high yield and oil content. The three lines that proved most promising, and are described, have been named Emanuele de Cillis, Emanuele Leggieri and Luigi Casella. The first has a vegetation period at Naples of 140 days, with a yield of 18–22 quintals per ha., and an oil content of 51·6%; the second has yielded 19–24 quintals, has an oil content of 51·9% and is otherwise similar, and the third has a vegetation period of 130 days, a yield of 16–22 quintals and an oil content of 50%. All three are drought resistant and free from premature defoliation.

1123. Trentin, A. 633.854.54:581.056(45)
Su alcune prove di adattamento e confronto tra varietà diverse di lino da olio. (**Some tests of adaptation and comparison between different varieties of linseed**).
Ital. Agric. **1943** : **80** : 268–73.

Trials were made in various localities with a number of the linseed varieties most commonly grown in Italy and figures are given concerning yield of seed. The results show that even in the classical linseed growing area of Bari some of the varieties from other zones outyielded the local types. In other zones too, the best yields were given by varieties introduced from elsewhere. The variety Capace tended always to outyield the others in soils possessing adequate moisture, whereas in arid soils it was surpassed by the varieties Marsic, Primus and Trento. The highest oil content was generally found in the Altamura variety, except in its own locality. The total yield of oil per unit area was more closely correlated with seed yield than with oil content.

1124. Donà dalle Rose, A. 633.854.54–1.521.5:575(45)
I controlli tecnici alle colture da semente di razze di lino da olio ed alcuni rilievi di morfologia fiorale. (**Technical control for seed crops of linseed races and some notes on floral morphology**).
Ital. Agric. **1944** : **81** : 113–16.

Linseed breeding in Italy was started in 1934 and several élite lines are now available. Observation plots of these are maintained in a number of typical areas and the necessity

for controlling the purity of the seed from these plots is emphasized; an examination of the size and form of the petals is regarded as the best way of detecting admixtures of other varieties.

1125. 633.854.54.00.14(41.5)

Production of linseed.

J. Dep. Agric. Eire 1947 : **44** : 72–79.

An account is given of linseed trials carried out in Eire for a period of several years. The varieties tested comprised a number of varieties primarily grown for fibre production, Argentine or Plate linseed and six linseed varieties introduced from the United States.

1126. MENDES, P. TEIXEIRA 633.854.56–2.111–1.521.6:575.127.2(82)

A cultura do tungue na República Argentina. (**The cultivation of tung in the Argentine Republic**).

Rev. Agric. S. Paulo 1947 : **22** : 181–88.

A description is given of experiments on tung under way at Misiones, Argentina. Interspecific crosses involving *Aleurites Fordii*, *A. montana* and *A. cordata* have been made. In general the F_1 hybrids are intermediate in morphology between the parents; their fertility is usually reduced though fertile plants do occur.

The objectives of interspecific hybridization include a reduction in the thickness of the pericarp of *A. Fordii*, and a combination of the resistance to cold of *A. Fordii* and the late flowering habit of *A. montana*.

1127. 633.854.78:575.12(89)
633.854.78:575–181(82)

MENDES, P. TEIXEIRA 633.854.78:575"793"(82)

A cultura do girassol no Uruguai e na Argentina. (**The cultivation of the sunflower in Uruguay and Argentina**).

Rev. Agric. S. Paulo 1947 : **22** : 189–94.

It is mentioned that hybridization of sunflower lines to combine desirable characters is being pursued at La Estanzuela, Uruguay, while at Pergamino, Argentina, selection of sunflower forms introduced from the U.S.S.R. has led to the production of short early types suitable for mechanized harvesting.

1128. 633.854.78:575.127.2:635.24:581.162.5
633.854.78:575.127.2:635.24:581.192

USTINOVA, E. I. 633.854.78:575.127.2:635.24:576.354.4

[**The fertility of hybrids of the sunflower and the Jerusalem artichoke (*Helianthus annuus* x *H. tuberosus*)**].

Priroda (Nature) 1947 ; No. **4** : 56–60.

Several generations of such hybrids have already been produced, and are found valuable on account of the silage which can be made from the whole plants, the sugar extracted from the stems, and perhaps rubber from the leaves. The prospect of a perennial variety of sunflower is also borne in mind.

According to the cytological studies of meiosis in the reproductive organs of the F_1 hybrid, which are described in the present article, the development of both the pollen grains and the eggs in the ovules is abnormal, and results in a large measure of sterility. In self pollination, the pollen grains never produced tubes which could reach the ovaries. Pollen from a sunflower could fertilize rapidly, but setting was rare because the embryo sac and its contents had either degenerated, or, having been fertilized could not usually develop into seed. I. Z.

1129. 633.854.78:581.162.32
635.61:581.162.32

KORNILOV, A. A. 633.14:581.162.32

(**Breeding cross fertilized plants**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 45–46.

Selection for thin husk in sunflowers, although successful, has led to a reduction in yielding capacity. The method of breeding has now been changed and consists of growing promising lines in juxtaposition and allowing them to interpollinate, after which the best types are selected and the process is repeated. In 1940 a plot of 1 ha. was sown with Saratov 169

alternating with rows of the broom rape resistant varieties Ždanov 1483 and Armavir 1813 and the variety with high oil content VNIIMK. The seed from open pollination from the varieties 1843 and 169 gave considerably higher yields than either parent. The hybrid 1483/169 exceeded Saratov 169 by 6% in seed yield and by 16% in oil content and exceeded 1483 by 28% in seed yield. The hybrids are selected for high yield and oil content, low husk, resistance to broom rape and other diseases and the progenies of the selected plants are sown together in groups for interpollination.

The hybrid 1483 x 1813 produced in this way has given excellent results in Central Kazahstan, where 1813 is too late in maturity and 1483 is too low in yield.

Similar methods have been used with success to improve the local melon of the Karaganda region, which is very early but low in quality. Hybrid 45 was obtained by open pollination of the local melon with the variety Kolhoznica and has round fruits with reticulated, orange skin, white aromatic flesh, high sugar content and small seed cavity. Hybrid 53 was obtained in the same way and has oval fruits with reticulated, orange skin, white tender flesh, high sugar content and small seed cavity. Both hybrids ripen early. All plants not conforming to the desired type were discarded.

The use of the same method in rye breeding has also been attended with success. Dolinka rye was sown in alternating rows with large grained ryes from the North Caucasus, Transvolga and Eastern Kazahstan and the product was subjected to selection. After repeating the process for four years several new varieties with larger grains than Dolinka rye were produced; the best form was Hybrid No. 2, with a thousand corn weight of 20–23 grm. The hybrids were equal or superior to Dolinka in yield but somewhat less winter hardy, and further selection is being exercised to correct this fault.

MEDICINAL PLANTS 633.88

1130. Rodriguez, J. M. and O'Donell, C. A. 633.88:581.6(82)
Plantas medicinales del noroest Argentino. (**Medicinal plants of north-west Argentina**).
Rev. Farm. B. Aires 1942 : **84** : No. 3 : Pp. 16; No. 4 : Pp. 13; No. 5 : Pp. 13; No. 12 : 525–33; 1943 : **85** : 197–207.
Rodriguez, J. M. and O'Donell, C. A.
Plantas medicinales del noreste Argentino. (**Medicinal plants of north-east Argentina**).
Ibid. 1943 : **85** : 53–65; 1944 : **86** : 57–66.

Descriptions are given of the morphology and uses of Argentine medicinal plants.

1131. Loustalot, A. J. 633.885.1:581.192:578.088.1
A semi-quantitative quick test for determining quinine in cinchona bark.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 386–90.

A simple rapid method for the approximate estimation of the quinine content of cinchona bark, based upon the thalleioquin reaction and developed at the Federal Experiment Station, Mayaguez, Puerto Rico, is described. The method requires a minimum of equipment and reagent, and bark samples of only 2 grm. But it has the disadvantages of giving only an approximation of the quinine content, i.e., within 1% of the amount actually present, and of including as quinine any quinidine or related substances giving the thalleioquin reaction. The method is considered to be valuable as a rapid preliminary test in breeding investigations, or for use by cinchona growers in culling low quinine yielding strains.

RUBBER PLANTS 633.91

1132. Mendes, L. O. T. 633.912:581.481
Poliembrionia em *Hevea brasiliensis* Muell. Arg. (**Polyembryony in *H. brasiliensis* Muell. Arg.**).
Rev. Agric. S. Paulo 1947 : **22** : 161–64.

Occasional instances of polyembryony have been found in seeds obtained by illegitimate pollination of the clone Prang Besar 86 (PB–86).

1133. 633.912–1.521.5:581.165.1(54.8)
633.912.00.14:581.165.71(54.8)
633.912–2.421.1–1.521.6(54.8)

SILVA, C. A. DE
Yields of budded rubber and clonal seedlings in commercial tapping.
Quart. Circ. Ceylon Rubb. Res. Scheme 1947 : **24** : 3–8.

HANSFORD, C. G.
The 1947 *Oidium* season at Dartonfield.
Ibid. 1947 : **24** : 23–28.

Notes and tables are given on the commercial performance of the following budded clones planted on estates in Ceylon: TJ.1, TJ.16, BD.5, BD.10, AV.49, AV.50, GL.1, PB.86, PB.186, HC.28 and HC.55; and of Prang Besar clonal seedlings.
The early yields obtained from the Prang Besar clonal seedlings continue to be promising. In most cases the seedlings have given yields higher than those from budded clones of approximately the same age; this is partly due to the fact that in the first years of growth the seedlings girth more quickly than budded trees.
Clonal seedlings are as susceptible to brown rot as budded rubber.
The need for more information on illegitimate clonal seed of various origins is stressed (cf. Abst. 1134).
At the higher altitudes in Ceylon *Oidium* disease is a serious factor in rubber production. Since it has not been possible to introduce material from South America, the search for *Oidium* resistance among the available clones and seedlings of the East is necessary. Attention is drawn to the advantages of budded rubber in the control of *Oidium*, since the old seedling rubber in Ceylon includes a wide range of types in which wintering is spread over such a long period that some proportion of the trees inevitably suffer severely from the disease.

1134. 633.912–1.531.12:581.165.1(54.8)
Clonal seed as planting material.
Adv. Circ. Rubb. Res. Scheme Ceylon : 1947 : No. 26 : Pp. 4.

This advisory leaflet for rubber planters in Ceylon discusses the value of (1) selfed clonal seed and (2) hybrid clonal seed in the form of legitimate hand-pollinated seed, "near-legitimate" seed from plantings of only two clones, hybrid seed from individual female clones in a polyclone nursery, and mixed clonal seed from a polyclone planting.
It is pointed out the planting of large areas with any type of clonal seed is considered to be risky under present conditions, in view of lack of information concerning the performance of clonal seed. Clonal seed, however, represents a definite improvement in comparison with the old type of unselected seed. Up to the present records are only available for the Prang Besar and Tjikadoe clonal seedlings; in the first two years of tapping these seedlings have compared very favourably with budded rubber. The seedlings also have the advantage of coming into tapping a year before budded stumps, and do not necessitate a delay of 18 months in the nursery. On the other hand it is not yet known whether the yields of the seedlings at later stages of development will equal those of budded rubber.
The present clones probably represent the maximum performance possible as a result of selection among the old mixed and unselected rubber population of the East. It is emphasized that the stage has now been reached when it is necessary to plant an improved seedling population from which to secure an entirely new series of selections.

1135. ANDERSSON, G. 633.913:575(48.5)
Gummimaskros. (***Taraxacum kok-saghyz***).
Sverig. Utsädesfören. Tidskr. 1946 : **56** : p. 320.

In spite of a yield of only 2% from supplies of unimproved *T. Kok-saghyz* received from Russia about 1944, hopes are entertained that, with the wide range of variation exhibited by this dandelion, systematic breeding may result at least in the production of an emergency plant of value.

1136. Black, M. W. 634(68)
Deciduous fruit varieties for the western Cape Province.
Fmg S. Afr. 1947 : **22** : 645–56.

The prospects of the fruit industry in western Cape Province are discussed, with reference to varieties of the peach, nectarine, plum, apple and pear. At present there is a general deficiency of suitable varieties of deciduous fruit trees in this region. Large scale trials of introductions and selections of varieties already grown in South Africa are therefore being carried out by the West Province Fruit Research Station. Extensive breeding work is also in progress.

1137. 634(79.4)
Yearbook of the California Avocado Society for the year 1946 (1947) : Pp. 172.

Report of the Variety Committee on avocados California Avocado Society, May, 1946. (pp. 12–16).

Varieties of avocado are discussed. The Fuerte, Hass, Anaheim, Nabal and MacArthur varieties are recommended for commercial cultivation in various districts of California. Notes are also given on a number of experimental varieties on trial, such as Tantlinger, Twomey and Rincon.

Report of the Subcommittee on root-stocks of the Variety Committee. (*pp.* 16–18).

The need for co-ordinated research on avocado rootstock problems is stressed. Investigations on the transmission of the sun-blotch virus are advocated, since nursery trees grown on Mexican rootstocks which have shown no visual symptoms of the disease have developed the disease, and the buds used have produced healthy trees when propagated on other stocks. Other investigations recommended include studies of stock and scion compatibility, and the relative merits of the Mexican and Guatemalan types of rootstock.

Palmer, D. F. *Report of Subtropical Fruit Committee.* (*pp.* 19–22).

The Charter cherimoya, May sapote and Macpherson mango have been registered with the Californian Avocado Society in the year under review. The economic possibilities in California of the following fruits and nuts are discussed: the loquat, feijoa, cherimoya, *Macadamia ternifolia*, *M. ternifolia* var. *integrifolia*, white sapote, African carissa, guava, persimmon, prickly pear, cactus apple, Cattley guava, purple passion fruit and mango.

Avocado seedlings registered with the society. (*pp.* 26–28).

Avocado seedlings registered with California Avocado Society are listed, with brief notes on their origin and characteristics.

Check list of avocado varieties. (*pp.* 29–53).

A list is presented of the avocado varieties which have been propagated commercially in California, varieties grown in Florida, and also in foreign countries. Brief notes are included on the origin and characteristics of the varieties.

Rounds, M. B. *The Fuerte avocado.* (*pp.* 54–56).

An account is given of the Fuerte avocado in California.

Griswold, H. B. *Primitive avocados of Central America and Mexico.* (*pp.* 103–05).

Wild forms of avocado observed in the course of a journey by the author through Mexico, Guatemala, El Salvador and Honduras are described. As a result of these observations it is suggested that a study of the wild types should provide a better understanding of the behaviour of the cultivated Californian varieties, particularly with regard to establishing the best cultural practices, and that the wild forms may prove to be valuable rootstocks. It is also thought that the Mexican types are widely adapted to conditions in California, particularly to the dry heat, and that the Guatemalan types would be best adapted along

the damper south coast of the United States. In addition, attention is drawn to the fact that the Guatemalan avocados are accustomed to greater waterlogging of the soil than the primitive Mexican types; the Guatemalan race should therefore provide a useful source of material resistant to waterlogging, a condition which is conducive to infection by *Phytophthora Cinnamomi.*

1138. MARIÑO, E. 634(86)
Catalogo de las plantas frutales propagadas para la distribución.
(**Catalogue of fruiting plants being propagated for distribution**).
Estac. Agric. Exp. Palmira No. 12 : Pp. 45.

The qualities and origins of the citrus fruit, avocado, mango, pineapple and a few other fruit varieties being maintained at the Palmira Agricultural Experimental Station, Colombia, are described.

1139. SPINKS, G. T. 634:575(42)
Progress report on fruit breeding.
Rep. Agric. Hort. Res. Sta., Long Ashton, Bristol 1946 : 20–23.

A report is given of the present position of fruit breeding investigations at the Long Ashton Research Station, Bristol. During the period 1939–45 no new breeding was undertaken and work was confined to the trial of previously developed seedlings.

Apple

Trials of named seedling varieties have been continued at Long Ashton, at Wisley in the National Fruit Trials and by growers in various parts of England.

As a result of these trials the varieties Plymouth Cross, Newport Cross, Hereford Cross and Gloucester Cross are no longer recommended.

The Worcester Cross apple, derived from a cross between Cox and Wealthy, is a good quality dessert apple, maturing somewhat later than Worcester Pearmain; but it is not prolific and the fruit is inclined to be too large. Taunton Cross is considered to have a number of advantages in comparison with Worcester Pearmain.

About 40 other seedling varieties are still on trial. Several early dessert varieties are among the selections, all developed from a cross between Worcester Pearmain and Beauty of Bath. These selections mature slightly later than Beauty of Bath; their quality is fairly good, and they are attractive in appearance. Two varieties obtained from the cross Allington Pippin x Star of Devon mature later than these selections but earlier than Worcester Pearmain; their appearance is attractive. An open-pollinated seedling of Beauty of Bath maturing at about the same time as the seedlings from the cross Allington Pippin x Star of Devon also shows promise.

Late seedling varieties from crosses involving Cox, American Mother, Sturmer Pippin and Court Pendu Plat as parents are under trial; many of these have the valuable character of late blossoming. Other varieties with various seasons of maturity have not yet been sufficiently long under trial for definite information on their value.

In addition to the above dessert varieties, culinary selections are being grown on a small scale.

In a new breeding programme recently begun, the chief objectives are the production of (1) good early and late dessert varieties, particular attention being given to late blossoming, and (2) improved varieties for cider.

Pear

Bristol Cross has given good results. It is similar to Conference but is earlier. The variety is a heavy cropper with good quality and scab resistance.

A seedling has been named Cheltenham Cross. This variety was developed from a cross between Dr Jules Guyot and Conference. It is bluntly conical in shape, about 4 x $2\frac{1}{2}$ inches in size, and has a fairly smooth skin of a pale lemon colour, sometimes slightly flushed. The qualities of the flesh are good. The variety matures in early or mid-September. Attacks of scab have been negligible.

Other seedlings under trial include selections from crosses of Conference with Durondeau, Dr Jules Guyot, Comice and Williams, and the crosses Bristol Cross x Comice, Bristol Cross x the late season seedling W. Ce. 5, and W. Ce. 5 x Comice.

New families are being raised with the object of producing improved late varieties; some of the best late seedlings have been crossed with Comice.

Plum

The Wye Cross and Avon Cross varieties appear to be too disease susceptible to be valuable. Teme Cross has given a better performance but is susceptible to brown rot. Severn Cross continues to be satisfactory at Long Ashton. Frome Cross was named in 1946 and distribution has been begun. This variety is a good quality cooking plum with a slight damson flavour; it is dark blue, moderate in size, and matures in the middle or latter part of September. Frome Cross resembles Wye Cross but appears to be superior, and is less disease susceptible.

Another new seedling has been named Thames Cross; propagating material is available. The variety has the same parentage as Severn Cross, viz. Coe's Golden Drop x Giant Prune. It is a dessert plum somewhat similar to Severn Cross but is slightly earlier. The fruit is very large, oval and regular in shape, and a pale golden colour. The qualities of the flesh are good. Up to the present trees of this variety have shown no disease symptoms.

New crosses are being made to produce early dessert varieties.

Blackcurrant

Mendip Cross and Cotswold have proved to be satisfactory. Malvern Cross was named and distributed in 1946. This new variety extends the season, since it matures slightly later than Baldwin. The bushes are vigorous and upright; the fruit trusses are moderate in length and compact; and the variety is a good cropper. The berries are easily detached from the stalk.

Other selections are still being tested on a small scale.

New seedlings are being raised to develop a late maturing variety with a high vitamin content; such a variety would be valuable to manufacturers of concentrated blackcurrant syrups.

1140. Alderman, W. H. and Haralson, F. E. 634:575(77.8)
Fruit breeding farm report for 1945.
Minn. Hort. 1946 : **74** : No. 1 : 3, 12–13.

A severe infection of apple scab provided an opportunity of observing varietal resistance of apples. Many of the hybrid crabs were almost completely resistant, especially seedlings from crosses between Dolga and Standard apples. Minnesota 240 was almost free from scab. Among the standard varieties Minjon was outstanding for its freedom from scabs on the fruits, while Heralson, Wealthy and Prairie Spy proved very susceptible.

Hybridization work was slightly curtailed owing to labour shortage, but the winter breeding programme in the greenhouse produced a fair amount of crossbred seed of hybrid plums, European plums, sandcherry hybrids, sweet and sour cherries, and apricots. In the field, an ample supply of strawberry seed was secured. Grape and raspberry breeding work was partially successful but the apple programme failed. The testing of apricots was continued. Tests of European plums indicate that the most promising varieties are Mount Royal plum, Gueii plum, Russian Green Gage plum, Pond (Pond Seedling) plum and Krikon damson. Dietz is regarded as fairly satisfactory though less consistent in production. Some 15 or 20 other varieties require further testing. Some progress is reported in the selection of peaches for winter hardiness of the tree and fruit buds. Of varieties previously selected and in second test, Minn. 9 appears to be the best and produced a full crop of fruit which ripened about the first of September. A list is presented of 18 varieties which seem to be most nearly ready for introduction.

1141. Thomas, P. H. 634:575(94.6)
The Summerleas Horticultural Experimental Station.
Tasm. J. Agric. 1947 : **18** : 175–80.

Investigations carried out by the Summerleas Horticultural Experiment Station, Tasmania, are described. The work consists mainly of the introduction, testing and propagation of fruit and vegetable varieties. Raspberry, blackcurrant and strawberry breeding are also in progress. A new raspberry variety developed at the station, known as Neika, is similar in

type to Lloyd George but more upright in growth, and more suitable for canning. Unlike Lloyd George, it is without the autumn fruiting habit.

1142. ANTHONY, R. D. 634:581.165.711:575.42(74.8)
Importance of parent tree selection in studies of seedling rootstocks.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 209–11.

The importance of the use of selected parent trees in the production of fruit rootstocks is discussed, with reference to experiments carried out by the Pennsylvania Agricultural Experiment Station on French crab apple root stocks and mazzard and mahaleb cherry rootstocks (cf. Abst. 1163).

1143. 634:581.6(49.4)
KESSLER, H. 635:581.6(49.4)
Die Sortenwahl, ein wichtiger Faktor bei der Herstellung vollwertiger Gefrierkonserven aus verschiedenen Obst- und Gemüsearten. (**The choice of varieties, an important factor in making satisfactory frozen preserves from various kinds of fruit and vegetables**).
Landw. Jb. Schweiz 1946 : **60** : 251–95.

In making preserves by freezing, the choice of varieties of fruit or vegetables to be used is more important than in methods in which heat is employed. In the tests made to determine which were the best varieties for freezing, varieties of fruit were chosen which were already important commercially, but in the case of berries and vegetables a few new types produced by the Federal Institute at Wädenswil were also included. From this preliminary work some results concerning the judging of quality were found, which should be useful in later breeding work. The number of varieties of fruits and vegetables tested were: 22 of cherry, 11 of strawberry, 13 of raspberry, 3 of blackberry, 9 of redcurrants and 3 of white currants, 18 of peas, 16 of dwarf beans, and 17 of pole beans.
In all varieties of bean having soft flesh the cuticle of the pods is liable to crack, so that the bean looks as though it were coated with fish scales. Pole beans show this defect more frequently than dwarf beans, but certain varieties of the latter are very prone to it.
Tables show full details of the quality for preserving of all the varieties of fruit and vegetable tested. E. W.

1144. ALDERMAN, W. H. and
HARALSON, F. E. 634:581.6(77.6)
Minnesota fruit breeding farm report for 1943.
Minn. Hort. 1944 : **72** : 90–91.

The following six fruit varieties have been introduced: Victory and Fireside apples (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 895), Redcoat and Pipestone plums (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 1178), Cascade currant and Burgundy strawberry (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 773). Apples, plums, grapes, strawberries and cherries likely to be introduced in the near future are described.

1145. 634:581.6(77.8)
Report of the fruit breeding farm visitors Committee 1944.
Minn. Hort. 1945 : **73** : No. 2 : 22–23.

Some new and promising varieties of strawberries, Korean cherries, Tomentoja hybrids (Nanking cherry), plums, apples and pears, which are approaching the stage where they can probably be named and distributed, are briefly described.

1146. OPPENHEIMER, C. 634–1.524(56.9)
The acclimatisation of new tropical and subtropical fruit trees in Palestine.
Bull. Rehovoth Agric. Res. Sta. 1947 : No. 44 : Pp. 184.

Detailed information is given on the introduction of the following tropical and sub-tropical fruits in Palestine: mango, avocado, persimmon, annonaceous fruits, myrtaceous fruits, loquat, papaya, passion fruit and a number of less important fruits. The commercial possibilities of the various kinds of fruit are discussed.

1147. 634.11:575(49.4)
634.75:575:581.6(49.4)
KOBEL, F. 634.835:575.12"793"(49.4)
Jahresbericht 1945 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. (**Annual report for 1945 of the Federal Research Institute for fruit, vine and vegetable culture at Wädenswil.**)
Landw. Jb. Schweiz 1946 : **60** : 191–209.

Fruit
From apple varieties bred at the Institute, fourteen of the most promising were grafted on the stocks E.M.I., II and IX for further test. The variety Bramley's Seedling is being tested to discover whether under Swiss conditions of cultivation it is as susceptible to browning of the flesh as it is in England. The Swiss-varieties Roter Delicious [Red Delicious] and Golden Delicious were released for multiplication in suitable parts of the cantons of Waadt and Wallis. These apples proved unsatisfactory in central Switzerland, for which, however, the variety Reinette grise Parmentier is being specially tested.
Various new strawberries are undergoing comparative tests, in which jam manufacturers are collaborating; a variety is needed, which will be more suitable for frozen preserves than the varieties Wädenswil III and Panther.

Vines
New crosses have been made to obtain an early ripening, high yielding, black wine grape.

Vegetables
The new cauliflower Argovia is to be multiplied. It showed more vigorous growth than the three varieties, including Saxa Original, with which it was compared; in quality it equalled Saxa Original.
A new, early frost resistant blue kohlrabi, Ozean, though not so tender or of such good quality as the white variety Rogglis Freiland, is equally early and high yielding.
The sugar pea Spahi from a Swiss seed firm equals the well known Swiss variety Schweizer Riesen (Swiss Giant) in size and yield; unlike the latter variety, however, Spahi has pods which are tender and stringless.
The breeding of stock seed of the Institute's vegetable varieties continues. E. W.

1148. BLAKE, M. A. 634.11:575(74.9)
Some problems involved in securing the prompt evaluation of the progeny of apple crosses.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 170–74.
The experience of apple breeding work at the New Jersey Agricultural Experiment Station is discussed with reference to the optimum cultural conditions for seedlings, pruning, the characters of the tree, flower and fruit which are useful in selection, and the response of seedlings to seasonal variation.

1149. HOWLETT, F. S. and
GOURLEY, J. H. 634.11:575(77.1)
Characteristics of the progeny obtained from utilizing standard commercial varieties in apple breeding.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 121–32.
The performance of seedlings obtained from crosses involving the apple varieties Delicious, Golden Delicious, Gallia Beauty, Rome Beauty, Jonathan, McIntosh, Northern Spy and Red Spy is described with detailed reference to the size, colour and quality of the fruit, flowering season and date of harvest. The work was carried out at the Ohio Agricultural Experiment Station. The results show that when used in suitable combinations, Jonathan, Northern Spy, Delicious, McIntosh and Golden Delicious produce seedlings with fruit of good dessert quality. If late flowering and late harvesting are also desired characters, Northern Spy appears to be the most valuable parent among the varieties investigated. On the basis of all five characters studied, viz., fruit size, colour and quality, late flowering and late harvesting date, the cross Northern Spy x Rome Beauty gave the best results.

1150. 634.11:576.356.5:576.354.4
VAARAMA, A. 634.11:576.356.5:632.111
Meiosis and polyploid characters in the tetraploid apple variety Hibernal.
Hereditas, Lund 1948 : **34** : 147–60.

Meiosis in the tetraploid ($2n = 68$) apple variety Hibernal is described, and the dimensions of the stomata and thickness of the leaves are compared with the corresponding measurements of other varieties as determined by various investigators. The possible origin of Hibernal and the homology of its chromosomes are discussed.

It probably arose spontaneously by somatic doubling following open pollination between two hardy diploid varieties. Both the morphology of the variety and the tendency to form multivalents at meiosis suggest an autopolyploid origin. The connection between polyploidy and climatic hardiness of apples is briefly discussed.

1151. KIESER, M. E. and 634.11:577.16
POLLARD, A. 634.13:577.16
The apple as a source of vitamin C. Tests in 1946.
Rep. Agric. Hort. Res. Sta. Long Ashton, Bristol 1946 : 132–37.

Some of the results of tests carried out during 1946 on the vitamin C content of culinary, dessert and cider apple varieties have been previously published (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 518); the present paper gives a full report of these vitamin C analyses and of storage tests on a few varieties.

The values for vitamin C content ranged from 7 to over 20 mg. per 100 grm. of fresh fruit. The cider varieties gave the highest values. Some of the dessert varieties possessed much higher vitamin C contents than those recorded in 1945 (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 66); some of the cider varieties showed similar discrepancies between the results of the two seasons. Among the culinary varieties Bramley's Seedling was consistently high in vitamin C content; among the cider varieties Yarlington Mill gave the highest values in both 1945 and 1946. A number of seedlings surpassed the older varieties in vitamin C values; no obvious relationship could be found between the level of the vitamin C content in the seedlings and their parents.

The loss of vitamin C as a result of storage was greater in the early maturing apple varieties than in varieties with better keeping qualities.

Analysis of ten pear varieties suggested that the pear is a poorer source of vitamin C than the apple.

Cooking tests on apples indicated that half to two thirds of the original vitamin C content is retained.

1152. HOWE, G. H. and
ROBINSON, W. B. 634.11:577.16(74.7)
Ascorbic acid content of apple varieties and seedlings at Geneva, N.Y., in 1944-1945.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 133–36.

The results of the analysis of many apple varieties and seedlings for ascorbic acid content, carried out at the New York State Agricultural Experiment Station, are reported. Ten varieties and seedlings yielded an unusually high ascorbic acid content, the Calville Blanc apple having the highest content of 37 mg. per 100 grm. of fruit. Sturmer Pippin ranked second, with an ascorbic acid content of 29 mg. Preliminary results suggest that the character of high ascorbic content may be directly inheritable.

1153. COUTAUD, J. 634.11:581.162.3:575.12(44)
Essais de fécondation artificielle effectués en 1944 sur quelques variétés de pommiers à couteau. (**Artificial fertilization trials carried out in 1944 on some dessert apple varieties**).
Bull. Soc. Bot. Fr. 1946 : **93** : 106–10.

The percentage of fruits set as a result of four self pollinations and 16 cross pollinations each involving an average of 60 flowers are reported. These results show that orchards should contain more than one variety; Reinette de Caux set only 30% fruits when self-pollinated but set 87% when fertilized by another diploid variety such as de l'Estre.

Pollination of diploids by triploids gave very poor results as compared with pollination by other diploids.

1154. Overley, F. L. and Bullock, R. N. 634.11:581.162.32:578.08(79.7)
Pollen dilutents and application of pollen to tree fruits.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 163–69.

The following methods of artificially pollinating apple trees have been tested at the Tree Fruit Branch Experiment Station, Wenatchee, Washington: the introduction of bouquets into the trees, the grafting of pollinators, and pollination by hand, small hand bellows, a water spray, by spraying a pollen mixture from an aeroplane, and by the use of bombs. Hand pollination was found to be the most reliable method.
The suitability of 13 substances as pollen diluents was also tested. Lycopodium proved to be the most suitable, but this substance cannot be used in bombs on account of its explosive nature.

1155. Diaz, J. R. 634.11:581.331.2
Ensayos sobre germinación del polen de manzanos en un medio artificial. (**Trials of pollen germination in apples on an artificial medium**).
Inst. Frutiviticult. Silvicult. B. Aires 1946 : **1** : No. 5 : Pp. 103.

Information is given on the germinability on sucrose agar of the pollen of a series of apple varieties grown in Argentina. Germinability was much affected by external conditions.

1156. McClintock, J. A. 634.11–1.541.1(77.2)
A strain of McIntosh compatible with Virginia crab stocks.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 181–82.

A strain of the McIntosh apple variety has shown compatibility with rootstocks of Virginia Crab in investigations at Purdue University, Indiana. Differences in compatibility evidently exist between different strains of McIntosh, since lack of compatibility of this variety with Virginia crab stocks has been reported by workers in New York State. In the experiments carried out at Purdue University it has also been observed that the average size of the fruits of McIntosh is larger on trees topworked with own rooted Virginia Crab stocks than on trees propagated by the usual methods on French Crab seedlings.

1157. Savidge, C. 634.11.00.14(42)
Cider apple production in Herefordshire: results from Burghill Trial Orchard, 1931-46.
Rep. Agric. Hort. Res. Sta. Long Ashton, Bristol 1946 : 116–27.

Information is given on the performance of a number of recognized cider apple varieties during the period 1931–46 in the orchard at Burghill, Hereford, which was established in 1908 under the National Fruit and Cider Institute scheme. Varietal behaviour is described with reference to the total average annual crop yields, variation in annual yield, general characteristics, and the frost resistance of the blossom. Data on the application and the results of certain spray treatments are also given.
The planting of canker resistant varieties is regarded as an essential requirement for the profitable production of cider apples and cider. Varieties most affected by the disease give almost valueless yields; and spray treatments had no significant effect in increasing the yield of canker susceptible varieties.
The planting of approved varieties is also advocated.

1158. Celestre, M. R. 634.13:575:581.037
Genetica del pero. (**Genetics of the pear**).
Ital. Agric. 1946 : **83** : 455–60.

During the first three to five years of fructification the form of the fruit in pear seedlings undergoes a gradual change and the fruit qualities of new hybrids are therefore studied for four to five years before making a decision as to their quality. The best are then grafted on to suitable rootstocks and if they maintain their good qualities, material is distributed to growers for further observation.
The seedlings produced from crosses in which the pollen had been subjected to irradiation with ultraviolet or X-rays or to an electromagnetic field were in general more resistant to

Venturia pirina and other diseases; certain promising drought resistant seedlings have also been obtained by electromagnetic treatment from the cross Butirra Hardy x Roosevelt. It is considered that the electrical treatment serves to eliminate less favourable gametes and hence increase the proportion of promising seedlings.

1159. Manaresi, A. and
Capucci, C. 634.13:581.192
Variazioni ambientali nella composizione chimica di due varietà di pere. (**Environmental variation in the chemical composition of two pear varieties**).
Riv. Frutticoltura 1941 : **5** : 57–72.

Analyses were made of the sugar, acid and dry matter content of the fruits of two pear varieties, Spina Carpi and Scipiona, grown in a number of different localities; great variations were observed in both varieties.

1160. Capucci, C. 634.21–2–1.521.6(45)
Nota sull'albicocco "Brusca". (**A note on the Brusca apricot**).
Riv. Frutticoltura 1941 : **5** : 143–61.

The apricot known as Brusca or Japanese apricot was imported into Italy from Greece in 1875. It ripens earlier than most varieties and because of this and its handsome fruits has retained its popularity in many areas. The variety is self-fertile and resistant to winter frosts and most diseases except *Clasterosporium carpophilum* (Lev. Aderhold). The fruit has an acid flavour even when ripe and although this reduces its popularity somewhat, it confers upon it a high keeping capacity; the fruit also travels well and is thus suitable for export. A full description of the variety is given.

1161. Philp, G. L. 634.23(79.4)
Cherry culture in California.
Circ. Calif. Agric. Ext. Serv. 1947 : No. 46 : Pp. 51.

Various aspects of cherry production in California are described, including the different types of varieties cultivated.

1162. Even-Ari, M.,
Kunis, A. and
Zirkin, D. 634.23:581.142
(**Conditions for the completion of ripening and methods of germination of *Prunus cerasia***).
Hassadeh 1947 : **27** : 382–84, 445–46.

Seeds of *P. Cerasus* do not ripen sufficiently without special treatment and therefore do not germinate normally. After-ripening should be carried out for three months at 5° C. and at high humidity. Seeds are gathered from ripe fruit in summer, cleaned and kept in moist sand till November. From November to February they are cooled to 4 to 5° C. and sown immediately afterwards. Thus germination of the sweet type was found to be up to 75% while even after this treatment the sour type gave only 56% germination. C. O.

1163. Clarke, W. S. (jun.) and
Anthony, R. D. 634.23:581.165.711(74.8)
An orchard test of mazzard and mahaleb cherry rootstocks.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 200–08.

Investigations on the performance of mahaleb (*Prunus Mahaleb*) and mazzard (*P. avium*) seedling rootstocks budded with the sour cherry varieties Montmorency and Saint Medard in an orchard at the Pennsylvania State College are described. The results suggest that the comparison of stocks of different sources is a more important field of enquiry than a comparison of mazzard and mahaleb stocks, since it was found that the performance of the two sour cherry varieties was as much influenced by the source of the seedling stock and the scion variety as by the species of rootstock.

1164. STEWART, N. 634.23.00.14(42.23)
An aspect of cherry growing.
Gdners' Chron. 1947 : **122** : 177–78.
A collection of the cherry varieties originally brought together by Messrs Grubb and Garner has been established at the Kent Farm Institute, Sittingbourne, Kent, as part of the National Fruit Trials of the Royal Horticultural Society. The work of establishing the trial orchard is described, and descriptive notes are given on 29 varieties.

1165. MORETTINI, A. 634.25:575(45)
Nuovi peschi d'incrocio. **(New peach hybrids).**
Ital. Agric. 1946 : **83** : 571–83.
Descriptions are given of twelve peach hybrids produced by the author. These are: (1) Morettini No. 1 (Superba x Fior di Maggio), which matures very early, immediately after Fior di Maggio [Mayflower] and before Amsden, and yields well; (2) J. H. Hale x Fior di Maggio, No. 5–14, an early variety which matures with Uneeda and Mikado but surpasses them in yield; (3) Superba x Fior di Maggio No. 2., distinguished by high keeping capacity, transportability and yield, maturing contemporaneously with Trionfo, Bonvicini and Mamie Ross; (4) J. H. Hale x Carman No. 0–14, a vigorous variety maturing with Carman, having large luscious fruits, not however suitable for transport; (5) J. H. Hale x Fior di Maggio No. 11–14, a very productive and vigorous hybrid, maturing at the same time as Eureka, Chilon and Early Crawford but surpassing them greatly in quality; (6) J. H. Hale x Fior di Maggio No. 9–14, which resembles the foregoing in most characters but ripens a few days later; (7) J. H. Hale x Trionfo No. 1–14, similar to Hale in type but more vigorous, pollen-fertile, 20 days earlier, ripening at the same time as Carrari and Superba [= Cumberland]; its earlier maturity enables it to escape the attack of pests such as *Laspeiresia* and *Ceratitis*, which damage Hale severely; (8) J. H. Hale x Trionfo Liscio No. 5–22, similar to the preceding variety but ripening a few days later; (9) J. H. Hale x Eureka No. 291, maturing somewhat before Eureka, which it surpasses in size of fruit and in vigour; the fruits are not very suitable for transport; (10) J. H. Hale x Admiral Dewey No. 286, characterized by large fruits which ripen at the same time as Eureka, S. Anna and Chilon but in other characteristics closely resemble the fruits of the Hale x Trionfo hybrids; (11) J. H. Hale x Admiral Dewey No. 146, similar to the foregoing except that the fruit is more elongated; (12) J. H. Hale x S. Anna No. 4436, a vigorous hybrid with white fleshed fruits ripening with Elberta, having good keeping capacity and transportability.

1166. HAVIS, L.,
WEINBERGER, J. H. and
HESSE, C. O. 634.25:575(73)
Better peaches are coming.
Yearb. U.D. Dep. Agric. 1943–1947 (1947) : 304–11.
The progress made in peach breeding in various regions of the United States is described.

1167. MCHATTON, T. H. 634.25:581.165.711:575.22(75.8)
Variations in peach tree yields.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 121–24.
Plots of Elberta peach trees were grown under uniform conditions of soil, climate and culture by the Horticultural Department of Georgia University, and studied for a ten year period. Variation between trees of the same plot was greater than variation between the plots. As the difference between the plots was not significant in many cases, it seems valid to assume the existence of genetic differences between the trees. The Elberta scions may be considered as genetically similar. The source of genetic variability is therefore to be found in the seedling rootstocks used. The importance of asexual propagation of selected stocks adapted to varieties and soils is therefore stressed.

1168. BLAKE, M. A. and
EDGERTON, L. J. 634.25:581.47:578.088
The value of stone markings in peach varietal identification.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 100–04.
The value of the pattern of markings on the stone in the identification of peach varieties is described.

1169. MOORE, R. C. and
FLORY, W. S. 634.25:581.49:575.11
Leaf gland inheritance in seedlings of Lovell and of several varietal hybrid peach populations.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 158–60.
The character of uniform leaf glands in the peach is a dominant character over the eglandular character, and depends upon a single gene. The heterozygous condition for the character of the leaf glands is expressed in the form of globose glands. Self-pollination of the heterozygous Lovell variety possessing globose glands resulted in seedlings with reniform, globose and eglandular leaf glands in the ratio of 1 : 2 : 1. It was also noted that susceptibility to mildew and the eglandular condition appear to be correlated.
Seedlings from the crosses selection R3–1 x Halehaven (reniform x globose), selection R3–3 x Halehaven (reniform x globose) and J. H. Hale x Halehaven (reniform x globose) were also studied. The two first named crosses gave seedlings with globose and reniform glands according to a 1 : 1 ratio. The last named cross, however, produced one seedling with globose glands and 118 seedlings with reniform glands; no explanation of this behaviour is suggested at present.

1170. MCHATTON, T. H. 634.25–1.421(75.8)
The comparison of plot size in a peach experiment.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 18–20.
An experiment was carried out by the Horticultural Department of Georgia University to compare the data on yield and growth obtained from large and small populations of peach trees during a ten year period. The results suggest that plots of from six to eight trees will give as satisfactory data as larger populations upon which to judge orchard performance.

1171. BLAKE, M. A. 634.25–2.111–1.521.6:578.08(73)
Some problems involved in securing an accurate measure of the cold resistance of dormant buds of different varieties of peaches.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 89–92.
A discussion is given of problems encountered in determining the cold resistance of dormant fruit buds of different peach varieties by the method of artificial freezing recently developed at the New Jersey Agricultural Experiment Station (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1489).

1172. MORRIS, H. F. 634.25.00.14(76.4)
Peach varieties for Central East Texas.
Bull. Tex. Agric. Exp. Sta. 1947 : No. 687 : Pp. 62.
Descriptive tables and notes are given on the large number of peach varieties which have been tested in eastern Texas. Varieties suitable for cultivation in this region are listed.

1173. TURRELL, F. M. 634.3:578.087
Estimating heights of citrus trees.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 147–50.
The use of the hypsometer in estimating the height of citrus fruit trees is described.

1174. FURR, J. R. and
REECE, P. C. 634.3:578.088.1:575.42(75.9)
Identification of hybrid and nucellar *Citrus* seedlings by a modification of the rootstock color test.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 141–46.
A colorimetric test is described by means of which nucellar seedlings of *Citrus* fruits can be distinguished from true hybrid seedlings. In addition to the use of the method in roguing nucellar seedlings, it is suggested that the results of the colorimetric tests may be of some value as indication of the possible parentage of hybrids whose origin is unknown.

1175. 634.3:581.162.51:576.356:575
634.3:581.162.51:581.036
NAKAMURA, M. 634.3:581.331.2:581.13:575

Cytological and ecological studies on the genus *Citrus*, with special reference to the occurrence of sterile pollen grains.

Mem. Fac. Sci. Agric. Taihoku Imp. Univ. 1943 : **27** : 53–159.

Comprehensive investigations carried out at the Horticultural Institute, Taihoku University, Formosa, on the causes of pollen sterility in species of *Citrus* and related genera are reported. Observations on the occurrence of pollen sterility were made in material representing 60 species and varieties of *Citrus*, four species of *Fortunella*, *Poncirus trifoliata*, three interspecific *Citrus* hybrids and four intergeneric hybrids. Out of the 135 different kinds of material studied approximately one half were classed as practically fertile, i.e. with a sterility of 10% or less, estimated on the basis of staining reaction to aceto-carmine; two practically sterile and seven as completely sterile; most of the remainder were classed as partially sterile, with a sterility ranging from 11% to 80%. To some extent the percentage of pollen grains presumed to be sterile was related to the systematic position of the sample. Sterility was most prevalent in Sect. *Limonellus*, *Citrophorum*, and Subsect. *Euacrumen*. Some *Citrus* interspecific and intergeneric hybrids proved to be partially sterile, while others were practically fertile. In general different strains of the same species of *Citrus* show a similar tendency with regard to pollen sterility. With the exception of *F. margarita* which showed partial sterility, the *Fortunella* species were found to be practically fertile. A fairly high percentage of sterility was noted in *Poncirus trifoliata*.

In previous investigations on the chromosome numbers of the chief species of *Citrus*, *Fortunella* and *P. trifoliata*, the author found that with the exception of two tetraploids, viz. Sampson tangelo (hybrid between *C. sinensis* and *C. tangerina*) and Shikinari Mikan (*C. madurensis*), all the numbers were diploid. Previous investigations also showed that chromosome affinity in *Citrus*, *Poncirus* and *Fortunella* was strong. Neither abnormality of chromosome number or weakness of chromosome affinity is therefore a cause of pollen sterility.

On the basis of staining reaction to aceto-carmine the pollen grains of *Citrus* could be divided into the following types: fertile normal grains, fertile giant grains, sterile grains of medium size, sterile giant grains, very small sterile grains, and sterile grains of the so-called satsuma type. Pollen grains of the latter type are almost the same size as normal grains but do not stain so deeply; such pollen grains only occur to a marked extent in *C. Unshiu*, *C. Unshiu* var. *praecox* and *C. Yatsushiro*.

The pollen sterility of *Citrus* is mainly the result of the medium sized grains, and partly very small sterile grains; occasionally giant sterile grains affect pollen sterility.

The pollen sterility of a single plant was found to vary among flowers opened on the same day and also among those opening on different days; this daily variation was generally associated with partial and practical sterility. It was similar within a given species and often in different species, indicating that it was dependent upon the environment. Observations on the Satsuma orange suggest that the temperature of the air has an important influence upon pollen sterility; this orange is pollen sterile in Japan proper but fertile under the climatic conditions of Raihoku, Formosa.

A study was made of the relationship between abnormal meiosis in the pollen mother cells and the temperature of the air in plants of the Eureka lemon (*C. Limon*) grown under field conditions. A close relationship between a decrease in the temperature of the air and the increased occurrence of irregular meiosis was established. Further investigations were carried out to determine the effect of controlled temperature upon meiosis in the Eureka lemon, Natsudaidai (*C. Natsudaidai*) and Kôshô Tankan (*C. Tankan*). Low temperature was found to disturb meiosis, but the different species varied in sensitivity to low temperature. In the Natsudaidai and Kôshô Tankan irregular meiosis was very rare at 20° C., and was not marked at 5° C. In the Eureka lemon, however, 12% meiotic abnormality occurred at 20° C., confirming the observation of meiotic abnormality in this lemon when grown under comparable conditions in the field; the meiotic abnormality increased to 50% at 5° C. Meiotic irregularity in the Eureka lemon therefore appears to be partly due to genetic

causes. These experiments also showed a disparity between the frequency of abnormal pollen tetrads and sterile pollen grains, indicating that in addition to sterility due to genetical factors and the influence of low temperature, degeneration of the pollen grains after normal meiosis causes sterility.

The sterile and fertile pollen grains of the giant type and the very small sterile grains are mainly the result of abnormal meiosis; the medium sized pollen grains arise as the result of post-meiotic degeneration.

Investigations on the growth of *Citrus* pollen grains revealed that sterile grains of medium size grow normally up to the period preceding the stage characterized by the presence of a large central vacuole but later degenerate, retaining the large vacuole and showing no starch granules; these pollen grains do not undergo mitosis, and evidently die through lack of nutrient. The author considers that the stage of pollen grain development characterized by the presence of the large central vacuole is a critical one in the growth of *Citrus* pollen grains. At this stage the development of the grain is temporarily suspended and cytoplasm is used up by the microspore; with the accumulation of sufficient nutrient substances and the concomitant disappearance of the vacuole, microspore development continues. It is thought that a gene acts upon the special tissues concerned with supplying nutrient substances to pollen grains, causing a deficiency of nutrients; and that difference in sterility between the various *Citrus* species may be due to differences in modifying genes.

Experiments showed that pollen grains in the stage of development characterized by a large vacuole were adversely affected by low temperature; this is ascribed to the increased deficiency of nutrients brought about by the slowing-down of the physiological processes of the plant under conditions of low temperature. The temperatures at which this adverse effect upon the grains was observed were similar to those prevailing during the flowering season under natural conditions at Taihoku.

In the sterile pollen grains of the so-called satsuma type the generative and vegetative nuclei degenerate continuously during the stage between the final period of microspore division and the conditions of another deficiency; such degeneration is probably due to the after effects of disturbance occurring at the critical stage in the development of the pollen grains.

The complete sterility observed in a few kinds of *Citrus* appears to be due to the degeneration of the pollen mother cells at an early stage, or non-differentiation of the archesporial cells.

In the general discussion of the results of the investigation, the author points out that in the case of *Citrus* pollen abortion is not necessarily indicative of hybrid origin. In this genus pollen sterility is evidently controlled by gene mutation as well as by the combination of genes due to hybridization.

The results of the experiments also reveal the possibility of controlling the formation of seed by planting under different conditions, since the pollen grains of a large number of *Citrus* species are very sensitive to the temperature of the air.

Finally, the data on the mode of occurrence of sterile pollen grains and the type of sterile pollen grains suggest that in the subsection *Euacrumen* consisting of *C. Unshiu, C. Yatsushiro* and *C. nobilis, C. Yatsushiro* is more closely related to *C. Unshiu* than is *C. nobilis.*

1176. Rossetti, V. 634.3–2.411.4–1.521.6(81)
Porta-enxertos de citrus resistentes à "gomose" de *Phytophthora* e à "tristeza".
(Citrus stocks resistant to *Phytophthora* gummosis and sadness).
O Biológico, S. Paulo 1947 : **13** : 89–90.

Since the bitter orange stocks previously used for citrus fruits in Brazil have proved susceptible to "sadness," an attempt has been made to substitute in their place, sweet orange stocks. The latter, however, tend to be susceptible to *Phytophthora* gummosis and a test of 100 varieties has been made to discover resistant forms. As a result of this test, the varieties Barão, Natal, Pêra, Côco and Mandarim are recommended as the most resistant types available.

1177. ANDRADE, D. X. DE 634.3–2.8–1.521.6(81)
A "tristeza" dos citrus. **("Sadness" of citrus fruits).**
Bol. Sec. Agric., Pernambuco 1946 : **12** : 45–48.
Combinations of citrus scion and stock varieties susceptible to "sadness" are listed. Bitter orange stocks appear particularly prone to attack.

1178. RUGGIERI, G. 634.31–2.191:575.247
Un caso di foliocellosi di carattere ereditario. (**A case of foliocellosis of a hereditary nature**).
Ital. Agric. 1946 : **83** : 659–61.
Interveinal chlorosis accompanied by stunted leaf development, resembling the condition resulting from zinc deficiency, was observed in one out of three branches of a common orange. Affected shoots grafted on to bitter orange preserved the abnormal characteristics and indicated that the condition was hereditary and probably arose as a bud mutation.

1179. 634.38:575.12:581.13(43.8)
BOGDAŃSKI, W. 634.38:581.6
Z działalności Centralnej Doświadczalnej Stacji Jedwabniczej w Milanówku. (**The work of the Central Silk Research Station at Milanówek**).
Przegl. Uprawy Tyton. Puławy 1939 : **6** : 223–24.
Morus alba var. *vulgaris*, which grows well in Poland, is highly resistant to slight frosts and does not need very good soil, in contrast to *M. nigra* which requires very good soil. The leaves of *M. nigra*, moreover, are less suitable as food for silk worms. Attempts are being made to increase the size of the leaves of *M. alba* var. *vulgaris* by crossing with mulberries of Italian origin, which have larger leaves, but the larger leaves of the hybrid were found to contain less nourishing constituents. E. W

1180. SCHROEDER, C. A. 634.42:581.162.3(79.4)
Pollination requirements of the feijoa.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 161–62.
Observations on the feijoa (*Feijoa Sellowiana*) at Los Angeles, California, indicate that this species is pollinated by insects, chiefly by bees, and that most varieties are partially self sterile, giving a considerably greater fruit set when cross pollinated than when selfed.

1181. HODGSON, R. W. and
SCHROEDER, C. A. 634.451:581.47:581.02(79.4)
Effect of climate on fruit form in the kaki persimmon.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 71–73.
Observations on 14 varieties of the Oriental persimmon (*Diospyros Kaki*) showed that in certain varieties, including the Hachiya and Fugi persimmon, fruit form is affected by climatic conditions. In these varieties the ratio of length/diameter of the fruit is greater in trees grown in the Sacramento Valley of northern California, where the climate is hot and dry, than in trees raised in the coastal plain of southern California, where the climate is cooler and damper. The varieties showing this climatic effect were characterized by pointed or rounded fruit apices. In certain other varieties, e.g. Honan Red, no such climatic effect upon fruit form was observed; in general these varieties were characterized by flat or depressed fruit apices.

1182. BONIFACIO, G. 634.462:581.162:575(45)
La biologia fiorale del carrubo e la possibilità di perfezionamenti genetici.
(**The floral biology of the carob and the possibility of improving it genetically**).
Riv. Frutticoltura 1942 : **6** : 51–53.
The carob fruit contains almost 50% of sugar and also serves as a source of gums and resins, and interest in it has extended recently. Although most carobs, as popularly supposed, are dioecious, many trees bearing hermaphrodite flowers also exist; although their fruits are hard and suitable only for use as forage, they are to be preferred as pollinators to male trees, which produce no fruit at all.

A study has been made of some 50 plants derived from high quality fruits; male, female and hermaphrodite plants appeared and some of the hermaphrodite plants formed fleshy fruits almost approaching those of the female plant in quality; it is thought that by appropriate breeding work it should be possible to attain a really high quality hermaphrodite form.

1183. Reed, C. A. 634.53:575.42(73)
The 1946 status of Chinese chestnut growing in the Eastern United States.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 139–46.

An account is given of the Chinese chestnut (*Castanea mollissima*) in the eastern United States, including its environmental requirements, bearing ages, the material at present available for planting, improvement work, pollination, harvesting and curing, storage, diseases and insect pests, and future possibilities as a nut-producing tree. Since 1930, varietal selection has been carried out, and selection and introduction are being continued. Descriptive notes are given on the varieties Abundance, Carr, Hobson, Reliable, Stoke, Yankee and Zimmerman.

1184. Beijerinck, W. 634.54:582:631.524(49.2)
Enkele gegevens betreffende hazelaars en de hazelnotenteelt. (**Notes on hazels and their cultivation for nuts**).
Ned. Boschbouw-Tijdschr. 1947 : **19** : Pp. 14.

The writer is hoping to restimulate interest in Holland in the production of hazelnuts, as the old nutteries have been replanted as orchards. He gives a brief description of the species and cultivated varieties, with illustrations of the nuts and their involucres, and mentions several species hybrids that are known. The geographical distribution of the species of hazels and the ecological conditions for growth, methods of multiplication and improvement are discussed, as well as the use of hazels in forestry and as ornamental plants and the cultivation of nuts and their value as food, including a table comparing their chemical composition with other sources of vegetable oils. C. B.

1185. 634.551:581.162.5:576.356
Almeida, C. R. Marques de 634.551:581.47:575.113.4
Acerca da improdutividade na amendoeira. (**The unproductiveness of the almond**).
An. Inst. Sup. Agron. Lisboa 1945 : **15** : 7–13.

Extensive researches have been undertaken with a large number of Portuguese almond varieties to ascertain the causes of the low fruit sets.

It has been confirmed that almost all almond varieties are self incompatible; José Dias and Duro Italiano, however, are self compatible. Details are given of the pollen germinability of many varieties in the styles of a large number of varietial combinations. Compatibility relations between varieties were found to be affected by the direction of crossing, and by ecological and geographical conditions.

Reduced fruit sets are also caused by meiotic irregularities, especially in varieties *fragilima* and *amara*, floral abnormalities, and different flowering times. Details are given of the flowering dates of 54 varieties.

The fragile endocarp of the Côco varieties is recessive to the hard endocarp of the Duro types; several factors appear to be involved.

1186. Whitehouse, W. E.,
Stone, C. L. and 634.574:581.143.7:575.127.2(79.4)
Jones, L. E. 634.574:581.165.711(79.4)
Vigor of *Pistacia* seedling progenies during first season in nursery.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 137–40.

Attention is drawn to the need for a high degree of initial vigour in *Pistacia* seedlings used for rootstocks, on account of the tap rooting tendency of the seedlings, which may result in the poor development of lateral roots, and the relatively large size of the grafted variety bud. Experiments were carried out at the United States Department of Agriculture, Chico, California, to study differences in the vigour of open pollinated seedling progenies of

Pistachio vera, *P. chinensis*, *P. atlantica* and *P. terebinthus*, and of various interspecific hybrids. Interspecific crosses in which *P. vera* was used as the female parent produced seedlings with good vigour and desirable form, a high percentage of which could be budded during the first season in the nursery.

1187. SELLSCHOP, J. 634.58(68)
Groundnuts.
Fmg S. Afr. 1947 : **22** : 705–12.

An account is given of groundnut production in the Union of South Africa.
It is mentioned that varietal tests have been conducted for a number of years at several experiment stations in the Union. At present, only the Virginia Bunch and Natal Common varieties are recommended. Breeding investigations are also in progress at the Potchefstroom and other experimental stations.

1188. BAILEY, L. H. 634.6:582(72.9)
Indigenous palms of Trinidad and Tobago.
Gentes Herbarum, Ithaca, N.Y. 1947 : **7** : 353–445.

A key to the palm genera of Trinidad and Tobago, and descriptions of the genera and species are presented, including a number of new species.

1189. CAVELL, A. J. 634.62:581.192(56.6)
Basra dates. Relationship between ripening and sugar content of twelve varieties.
J. Soc. Chem. Ind., Lond. 1947 : **66** : 195–98.

The results of an investigation of the sugar content at different stages of ripening of 12 date varieties grown in Iraq are reported and interpreted. As compared with these varieties, the variety Deglet Noor when grown in U.S.A. shows a marked difference in chemical composition.

1190. GOOR, A. 634.63(56.9)
(**Olive varieties in Palestine**).
Hassadeh 1947 : **27** : 273–77, 328–32, 376–81, 433–37.

After a general introduction which deals with the question of how to describe a large assortment of horticultural varieties within a single species, the author gives very careful descriptions of the important botanical and horticultural characters of eight local and ten imported olive varieties and their use for oil or pickling. Photographs and drawings are added. C. O.

1191. CONDIT, I. J. 634.63(79.4)
Olive culture in California.
Circ. Calif. Agric. Ext. Serv. 1947 : No. 135 : Pp. 36.

The bulletin includes descriptive notes on the olives, Mission, Manzanillo, Sevillano, Ascolano and other varieties.

1192. FINATO, P. 634.63:581.162
Olivo a doppia fioritura. (**An olive with double flowering**).
Ital. Agric. 1946 : **83** : 325–26.

Two olive trees are described which have compound inflorescences, the flowers of which develop and set fruit in succession, thus giving the impression of a second flowering.

1193. DOJMI DI DELUPIS, S. 634.63:581.48:519.241.1
Ricerche biostatistiche sulla variabilità dei caratteri nell'olivo coltivato.
(**Biostatistical studies on the variability of characters in the cultivated olive**).
L'Olivicoltore 1942 : **19** : No. 8 : Pp. 10.

Figures from observations made at the Olive Research Station at Pescara in Italy, together with published data, show that the fruit length and breadth of 247 Mediterranean olive varieties varies in an unbroken curve, 68·27% of the frequency lying between 16·7 and 25·7 mm. for length and 11·4 and 17·8 mm. for diameter, the coefficients of variation being 21·9% and 21·2% respectively. The ratio of length to diameter varies between 1·21 and 1·73, with a mean of 1·47. Fruit weight varies from 1·14 grm. to 3·66 grm., with a mean of

2·40 grm. and a coefficient of variation of 52·5%; variation coefficients as high as this were found for fruit weight within a single variety.
Similar measurements were made on the seeds in 370 varieties; 68.27% of the values fall between 13 and 19 mm. for seed length, with a coefficient of variation of 18·3%; for seed diameter the values were between 7·02 and 9·16 mm. with a coefficient of variation of 13·9%, and the length : diameter ratio between 1·7 and 2·3.
Variations in length of seed are accompanied by corresponding variations in diameter, but the proportionality between the two is different in different varieties; it is calculated according to the formula $d = w + u.l$, where d = diameter, l = length and w and u are two statistics. The values of u varied from 0·011 to 0·464 and the values of w from 1·54 to 10·22 in 55 varieties studied. The relationship between u and w was found to be expressed by the formula $u = u_{max} - k.w$, where u_{max} was a fixed statistic characteristic of the variety and k was a constant. When varieties were arranged according to the values of u_{max} they fell into four main series and varieties with similar seed types generally came together. The statistics in question are thought therefore to correspond to inherent genetical differences and to be of real value in studying varieties.

1194. Favilli, R. 634.63:582:519.24
Ricerche biometriche sull'olivo Punteruolo e sull'olivo di Monopoli. (**Biometrical studies of the Punteruolo and Monopoli olives**).
Ann. Fac. Agraria, Pisa 1943–1945 : **6** : 80–119.
Measurements were made on 500 drupes from the same tree and at the same stage of development, in each of the two varieties. The characters studied were weight of drupe and of stone, the difference, the longitudinal and transverse dimensions of drupe and of stone and their ratios, and the ratio of weight of drupe to weight of stone. The mode, standard deviation and coefficient of variation were calculated, with their respective errors, and the results are presented in tables and graphs. They show that the variety Punteruolo has larger and more elongated fruits, which however have a lower proportion of flesh than those of Monopoli. The character which showed the least variation was the ratio of length to breadth of the stone and also of the fruit. The two dimensions varied together and always showed high correlation coefficients. These two characters are therefore recommended for use in varietal discrimination.

1195. Hume, E. P. and
Cobin, M. 634.65:581.14
Relation of seed size to germination and early growth of mangosteen.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 298–302.
Experiments were carried out to study the effect of seed size upon the germination, survival and growth of mangosteen seedlings, and of the effect of seedling size at the time of transplantation upon survival. Percentage seed germination increased with each 0·1 grm. increase in seed weight between seed weights of 0·2 and 1 grm.; above the latter weight seed size had little or no effect upon germination. Seedling survival and growth increased with greater seed weights up to approximately 1·3 grm.; above this weight they were apparently unaffected by seed size. Seedling mortality was greater in plants transplanted at the four and six leaf stages than at the two leaf stage. The characteristics of the germination, root and early growth of the mangosteen are discussed in relation to these results.

1196. Coêlho, M. 634.651:577.8:575.11(81)
Observações sôbre o mamoeiro. (**Observations on papaya**).
Bol. Sec. Agric., Pernambuco 1944 : **11** : 13–29.
A discussion is presented on the papaya varieties of Pernambuco, Brazil. Two types appear to be fairly constant, and these are named Cedro and Nobrega. Within each of these varieties, three parallel types are found: (1) a form with globose fruits and dioecious flowers; (2) a form with elongate fruits, and hermaphrodite flowers bearing tubular corollas; and (3) a form with globose angular fruits, and hermaphrodite flowers bearing partite corollas.
The various sexual types of papaya encountered in Pernambuco are enumerated. When polygamous trees are selfed or intercrossed with similar trees, polygamous and dioecious

offspring are produced in a ratio of 2 : 1. This ratio is independent of the position of the F_1 seed in the parent fruit.

1197. SWINGLE, C. F. 634.651–1.524(71+73)
The Peruvian cooking papaya, *Carica monoica*, a promising new fruit and vegetable for the United States corn belt.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 137–38.

The fruits of *C. monoica* are not edible in the fresh state, but when cooked with sugar and a little lemon or lime they resemble stewed peaches and apricots. In addition, the cooked leaves of the mature and immature plants can be used as a green vegetable. Observations have been made on the species at the Tingo Maria Experiment Station, in the Upper Amazon Basin of Peru. It is believed that the species could be grown as an annual throughout a considerable area in the United States and also in Canada, and trials are recommended. Seed has been sent to the United States sufficient for extensive small scale tests.

1198. ACUÑA, J. and
ZAYAS, F. DE 634.651–2.8–1.521.6:575(72.91)
El mosaico y otras plagas de la fruta bomba (*Carica papaya* L.) [**Mosaic and other diseases of papaya (*C. papaya* L.)**].
Circ. Estac. Exp. Agron. Cuba 1946 : No. 85 : Pp. 32.

After a section dealing with various insect pests and fungus diseases affecting papaya in Cuba, an account is given of the two virus strains known as bunchy top and Cotorro mosaic. Details of varietal resistance to these two strains are given. The varieties most resistant to bunchy top are Colombiana, Mamey de Botánica, Castilla and Mamey. Resistant plants are to be used in a breeding programme to obtain new virus resistant varieties.
The wild Cuban species *C. prosaposa* is susceptible to virus attack.

1199. GROSZMANN, H. M. 634.653(94.3)
Avocado varieties.
Adv. Leafl. Dep. Agric. Qd 1947 : No. 114 : Pp. 6.

Desirable characters in avocado varieties are discussed. The varieties Fuerte and Nabal are recommended as the most suitable for commercial cultivation in Queensland. The testing of introduced varieties and seedlings derived from the most promising varieties will be continued by the Department of Agriculture.

1200. MARIÑO MORENO, E. 634.653–2.7–1.521.6:582(86)
El *Copturomimus Perseae* Hustache. Nueva especie entomologica, grave plaga del aguacate en Colombia. (***Copturomimus perseae* Hustache. A new insect species acting as a serious pest of avocado in Colombia**).
Rev. Fac. Nac. Agron. Colombia 1947 : **7** : 167–89.

After outlining the botanical classification of the avocado, the author describes a newly discovered pest, *C. perseae*. The varietal susceptibility of the avocado varieties grown at the Palmira Experimental Station has been investigated. The most susceptible varieties are usually forms of high commercial quality.

1201. BUTTERFIELD, H. M. 634.7(79.4)
Bush berry culture in California.
Circ. Calif. Agric. Ext. Serv. 1947 : No. 80 : Pp. 56.

This bulletin on the various aspects of bush fruit cultivation in California includes descriptive notes on blackberry and dewberry varieties; the Boysen, Logan, Phenomenal, Young, Nectar and Ross blackberries; red, black and purple raspberry varieties; currant varieties; gooseberries; and huckleberry and blueberry varieties.

1202. DARROW, G. M.,
WILLIAMS, C. F. and
WALDO, G. F. 634.71:576.356.5:575.12(73)
Breeding studies in eastern states with the western trailing blackberries.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 186–88.

Extensive breeding work with the western trailing blackberries of the Pacific Coast region is

being carried out at Corvallis, Oregon; the Cascade and Pacific varieties have resulted from this work (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 736). But the results of investigations in Oregon are not applicable to the eastern United States, as the diseases affecting varieties and the climatic responses of the varieties differ greatly in the two regions. An attempt is therefore being made to obtain varieties of higher dessert quality which are adapted to the eastern and northern states. Crosses have been made in Oregon between adapted eastern varieties and varieties derived from the western trailing blackberry, the seed of which has been sent to Beltsville, Maryland. The resulting seedlings have been tested at Beltsville, Maryland, and in North Carolina. The following crosses were made: Hunter x Lucretia, Zielenski x Lucretia, Zielenski x Eldorado, Pacific x Lucretia, Ideal Wild x Eldorado, Ware x Eldorado, Starr x Lucretia, Starr x Eldorado, Elmer Johnson x Lucretia and Pacific x Himalaya.

Additional crosses have been made at Beltsville, Maryland in an attempt to develop hardier varieties, as follows: Boysen x Austin Thornless, Austin Thornless x Boysen, Boysen x Brainerd and Eldorado x Boysen. A selection from the cross Boysen x Brainerd and a selection from the cross Eldorado x Boysen appear to be hardier than Boysen and are being given row tests.

Although no varieties adapted to the eastern states have yet resulted from this breeding work, some progress has been made; and the results suggest that in making crosses between different groups of varieties use should be made of varieties with high chromosome numbers rather than low chromosome numbers. It is thought that instead of the hexaploid variety Lucretia use of the octoploids Premo and Windom might give more valuable results; similarly, use of the hexaploids Rathburn and Erie instead of the tetraploid Eldorado is recommended.

1203. YARNELL, S. H. and BLACKHURST, H. T. 634.71:576.356.5:575.127.2(76.4)

A polyploid chromosome series from a cross of the Lawton blackberry and the Nessberry.

Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 189–92.

The Nessberry ($2n = 28$), which was originally obtained from the cross *Rubus rubrisetus* x Brilliant red raspberry in 1917, was crossed with the Lawton blackberry. The cross Lawton ♀ x Nesberry ♂ resulted in 24 plants; a single plant ($2n = 28$) was produced from the reciprocal cross. The former plants included four small diploid plants ($2n = 14$), four vigorous triploids, 11 tetraploids similar in appearance to the Lawton parent, four tetraploid plants obviously hybrids, and a single pentaploid plant also hybrid in appearance. Descriptions are given of the different types of seedlings, and their possible origin is discussed.

1204. 634.711:575(74.7)

Nationwide fruits. Raspberries.

Amer. Fruit Gr. 1947 : **67** : No. 11 : 16–17.

A note is given on the new red raspberry variety September, developed by New York Agricultural Experiment Station from a cross between Marcy and Ranere. The fruit is medium-sized, firm and bright red coloured. The variety is an ever-bearing type producing a high quality autumn crop. Its autumn crop ripens two to four weeks earlier than that of Indian Summer, while its summer crop ripens as early as that of Indian Summer. The chief fault of the variety is the tendency of the fruit to cling to the bush more than is desired in a commercial raspberry.

1205. HUDSON, J. P. 634.711–1.524:632.8–1.521.6(42)

The story of a raspberry variety.

N.Z. J. Agric. 1947 : **75** : 179–80.

Samples of virus-free Lloyd George raspberry were re-introduced into Britain from New Zealand in 1945. The lot established at the East Malling Research Station has not exhibited any virus symptoms in graft tests made in 1946. The prospects of re-introducing from New Zealand virus-free stocks of Lloyd George and other raspberry varieties which have degenerated in Britain are briefly discussed.

1206. Brandtsegg, O. and
Kvåle, E. 634.723.00.14(48.1)
Solbaer på Kvithamar 1931–1945. (**Black-currants at Kvithamar 1931-45**).
Meld. Stat. Forsøksgard Grønsakdyrking Kvithamar Stjørdal 1945 (1947) : **26** : G57–60.

The comparison given here of yields, habit, reaction to frost, and other economic features of eight varieties of blackcurrant is based on observations of their performance during 14 years at Kvithamar, Norway. The trial was planned and the bushes supplied by the Statens Forsøksgard Njøs [Njøs State Experimental Farm]. The varieties included Boskoopjempe [Boskoop Giant] and Langklasa [Long Bunch] which may, it is thought, be the same variety; Bang up; Edina and Svart Drue [Black Grape].

1207. Darrow, G. M. 634.73:575(73)
New varieties of blueberry.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 300–03.

Blueberry breeding work in the United States is summarized.

1208. Meader, E. M. and
Darrow, G. M. 634.73:581.162.3(75.2)
Highbush blueberry pollination experiments.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 196–204.

Greenhouse and field experiments on pollination in 15 highbush blueberry varieties, carried out during the period 1943–45 by the United States Department of Agriculture, Beltsville, Maryland, are reported.

In general it was found that cross pollination usually increased the crop sufficiently to warrant the interplanting of two or more varieties in commercial cultivation. Larger and earlier maturing berries and an increased percentage of fully developed seeds per berry also resulted from cross pollination in comparison with self pollination.

1209. Bailey, J. S. 634.73–1.547(74.4)
Development time from bloom to maturity in cultivated blueberries.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 193–95.

A determination in several blueberry varieties of the time in days between full bloom and the first fruit picking and between the first open blossom and the first ripe fruit showed that these periods are too variable to be used for estimating dates of picking, and are influenced considerably by the weather during the growing season.

1210. Lundin, H. 634.74:575.127.2:577.16(48.5)
Askorbinsyrehalten i vissa jordbruksprodukter. Förädlingsförsök med nyponbuskar, för erhållande av nypon med hög askorbinsyrehalt, lämpliga för industriell bearbetning. (**The ascorbic acid content in certain agricultural products. Breeding experiments with wild rose bushes to obtain hips with a high ascorbic acid content suitable for industrial use**).
Nord. JordbrForskn. 1946 : No. 3–4 : 65–85.

This is an extract from a lecture to the Scandinavian Association of Agricultural Research Workers [Nordiska Jordbruksforskares Förening] at Lund in July, 1945.

Previous work on the ascorbic acid content of potatoes, green vegetables and root crops is noted, with a table showing the content of ascorbic acid, vitamins B_1 and B_2, and carotene in potatoes, root crops, green vegetables, and fruits. Swedish investigators have found that the ascorbic acid content was often higher in the forms they examined than in corresponding forms in southern countries.

A study, not yet completed, of the effects of light and mineral manures on the production of ascorbic acid in certain green vegetables suggest that the kind of illuminaition is an important factor affecting ascorbic acid content.

Work on hips has been in progress for many years, and over 150 species, mainly of the

sections *Caninae* and *Cinnamomeae*, together with nearly 1000 plants of *Rosa rugosa*, raised from seed, have provided nearly 10,000 samples of fresh hips for analysis. The results show that (1) the ascorbic acid content varies with the stage of maturity, but that forms also differ in the time at which the content is highest; (2) the degree of the capacity for ascorbic acid production is heritable and the content is thus not primarily dependent on weather and locality.

The species with the highest content, *Rosa nipponensis*, *R. Beggeriana*, *R. pisocarpa*, and *R. Fedtschenkoana*, contain from 9 to 12% (*R. Fedtschenkoana*, up to 16%), and the species with the lowest content contain from 0·2–0·3%. Within one and the same species the extremes of the range of variation may be as 1 : 3.

Analyses of 116 specimens, representing about 40 species, forms and hybrids of the *Cinnamomeae*, and analyses of 210 specimens, representing species and forms of *Caninae*, has shown that the hips from the former group contain nearly double the amount of ascorbic acid of those of the latter group. Most of the roses with high ascorbic acid content are tetraploids, though no actual correlation between polyploidy and ascorbic acid content could be demonstrated.

Schröderheim [unpublished] has found in the *Caninae* a positive correlation between a low number of achenes and high ascorbic acid content. He found no correlation in the *Cinnamomeae*.

The ideal dog rose for cultivation as a source of ascorbic acid should be hardy, comparatively low growing with no or very few thorns and bearing abundant hips of high ascorbic acid content with thick, firm walls and few achenes.

As a preliminary to crossing operations, Fagerlind and Gustafsson investigated pollination, fertility, parthenogenesis and chromosome numbers and compatibility in the genus *Rosa*. Fagerlind and Kiellander have also made some thousands of crosses of élites of *Rosa rugosa*. Gustafsson has also made crosses between (*a*) species of the *Caninae* and *Rosa rugosa* and (*b*) between *Caninae* species *inter se*. In group (*a*) of the hybrids, transgressive types as regards ascorbic acid content were obtained with the additional advantage of highly sterile hips with very few achenes. In group (*b*) six hybrids of *Rosa canina* x *R. rubiginosa* were found to have a considerably higher ascorbic acid content (3·3–4·3%) than the parent forms; and the absolute weight of ascorbic acid per hip also showed a marked rise. The reciprocal cross gave very poor results. Gustafsson concluded from his hybridizations that certain combinations, even in the F_1, may give promising breeding material.

Suitable forms should be selected for crossing, and the progeny of the F_1 combinations and back-crosses should be studied. This work is now proceeding. Other potentially interesting crosses are also recorded.

Chromosome reduplication in *Rosa* species and hybrids is being tried as a possible way of obtaining viable types with high ascorbic acid content. Fagerlind has worked extensively on this question.

There is a long bibliography relating mainly to Swedish research.

1211. Melville, R. and
Pyke, M. 634.74:577.16:576.312.35
The effect of specific variability and the environment on the vitamin C content of British rose hips.
Proc. Linn. Soc. Lond. **1947** : **159** : 5–16.

The mean vitamin C content of the hip flesh of 14 British *Rosa* species ranged from 75 mg. per 100 grm. in *R. arvensis* to 1303 mg. per 100 grm. in *R. mollis*; there was considerable variation within species and varieties. Darlington's suggestion (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 10) that vitamin C content is closely correlated with chromosome number in the genus *Rosa* was not supported by these observations on British species. The fact that the sepals of all the four British species with the highest vitamin content remain erect in the ripe fruit favours the contention of Čajlahjan [Chailakhyan] that there is a correlation between vitamin content and persistently erect sepals throughout the genus. Neither earliness of ripening nor fertility of the hips (measured by the proportion of achene weight to total hip weight) are correlated with vitamin C content. The influence of external conditions on vitamin content is examined.

1212. DARROW, G. M. 634.75:575(73)
Finer strawberries ahead.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 293–99.
Strawberry breeding investigations in the United States are reviewed. A useful list is included summarizing the main characteristics of the chief varieties and selections.

1213. WALDO, G. F.,
DARROW, G. M.,
JEFFERS, W. F.,
DEMAREE, J. B. and
MEADER, E. M. 634.75–2.411.4–1.521.6:575(73)
Breeding strawberries for resistance to red stele root disease.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 219–20.
An abstract is given of a previously published paper (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1770).

1214. 634.776:576.312.35
MCCANN, L. P. 634.776–1.524(73)
Ecuador's naranjilla—a reluctant guest.
Agric. Amer. 1947 : **7** : 146–49.
The South American fruit species, *Solanum quitoense*, is described. The plant fails to set fruit in the continental regions of the United States. Investigations have been carried out at the Plant Industry Station, Beltsville, Maryland, on the following: the effect of day length on flower bud initiation; the effect of growth regulating substances upon fruit set; graft compatibility with other members of the Solanaceae; vegetative propagation; and chromosome number. Root tip counts have shown a chromosome number of $2n = 24$.

1215. 634.8:35
IIIrd International Congress of the International Wine Office, Istanbul Oct. 2-6, 1947.
F. A.O. European Bull. 1947–48 : No. 3 : 221–23.
The recommendations put forward by the congress of the International Wine Office are given. The congress was held in October 1947 at Istanbul. A number of the recommendations deal with varietal questions and with the international organization of research on grape and wine production.

1216. AMERINE, M. A. and
WINKLER, A. J. 634.8:581.6(79.4)
The relative color stability of the wines of certain grape varieties.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 183–85.
Marked differences in the colour stability of wines produced from different varieties and from grapes of different seasons in California are reported. Among the nine varieties tested Alicante Bouschet and Grand Noir showed the greatest loss and Cabernet Sauvignon and Valdepenas the least.

1217. ANTUNES JÚNIOR, A. A. 634.835(46.9)
Ribatejo vinícola. (**The viticulture of the Ribatejo province**).
Minist. Econ. Portugal 1946 : Sér. Estud. Inform. Técn. No. 32 : Pp. 203.
The general account of the viticulture in the Ribatejo province, Portugal, includes descriptions of the following varieties: Boal de Alicante, Boal Branco [White Boal], Boal Carrasquenho [Oaken Boal], Fernão Pires, Tamarês, Rabo de Gato [Cat's Tail], Tália (= Branquinha), Rabo de Ovelha [Sheep's Tail], Olho de Lebre [Hare's Eye], Trincadeira Branca [White Trincadeira] Trincadeira das Pratas [Silver Trincadeira], D. Branca, Moscatel de Jesus, Diagalves, Malvasia, João Paulo, Galego Dourado [Golden Galician], Arinto, Trincadeira, Bastardo, Bastardinho, Tintureiro [Dyer], Mortágua Preto [Black Mortágua] = Castelão [Castellan], Castelão Frances, Preto Martinho [Black Martinho] = João de Santerém = Periquita, Tinta Miúda [Little Tinted] = Padre António, Xerez, Preto Castiço [Black Elite], Tinta Mole [Huge Tinted] = Negra Mole [Huge Black] = Sobreirinha Mureto, Mourisco Tinto [Tinted Moorish] = Mourisco Preto [Black Moorish], Baga =

Poerinha, Benvedro = Murteira = Marota, Parriera Matias = Parrilha, Alicante Heny Bouschet, Grand Noir de la Calmette [La Calmette Large Black], and Petit Bouschet [Little Bouschet] = Teinturier Bouschet [Dyer Bouschet].

1218. Dalmasso, G. 634.835:575(45)
Notizie su incroci di "*Vitis vinifera*" ottenuti a Conegliano. (**Notes on the *V. vinifera* crosses obtained at Conegliano**).
Ann. Staz. Sper. Vitic. Enologia Conegliano 1944–45 : **12** : 3–12.

The vine variety Piccolit produces excellent wine of the Tokai type but produces almost exclusively female flowers and generally gives a very low yield of fruit. It was crossed with a number of other varieties and a study is being made of the hybrids and of the wine produced from them. Some of them seem distinctly promising. Crosses have also been made with varieties of the Riesling type and of the Tokai varieties Furmint and Harstvetü, and some of the hybrids have shown notably high yields combined with high sugar content. Certain hybrids from the Piedmont varieties of the Barbera type are under observation. Among hybrids of table varieties several promising combinations have been found, for instance Frankenthal x Zibibbo, Bicane x Regina, Bicane x Moscato di Terracina, Hamburg Muscat x Regina and Hamburg Muscat x Pirovano 62.

1219. Cosmo, I. 634.835:575:581.6(45)
Le uve da tavola nelle Venezie: risultati di un decennio d'indagini, indirizzo per i futuri impianti. (**The dessert grapes in the Venice provinces: results of ten years of investigation, indications for future plantings**).
Ann. Sper. Agrar. Roma 1940 : **37** : 5–188.

The results are presented of observations carried out in 43 experimental plantations, in which the varieties were judged in regard to their cultural characteristics, type of fruit, flavour and quality and time of ripening. Information is given regarding the soil and other conditions in the several plantations, and of the rootstocks employed. The varieties are then treated in turn, data being given on their parentage and history, characteristics, vigour, time of maturity, reaction to different rootstocks, yield, resistance to diseases, fruit quality, and any special defects or merits, as a result of which they are classed as I, II or III in merit. The varieties are mentioned in alphabetical order under their most common names, but synonyms are indicated where they exist. Further lists are given where the varieties are classified according to time of ripening, to colour of fruit, and to flavour respectively. Certain seedless varieties and others capable of being used both for dessert and wine making are indicated. In a final section recommendations are given regarding the most suitable varieties for cultivation in the different zones of the province. Certain varieties are recommended for limited areas only, others are recommended unreservedly for the whole province; of these there are 16; four are in the group of first earlies, ripening in the second half of July, namely Perla di Csaba, Primus, Volta and Precoce di Marsiglia (Marseilles Early); the second early type ripens from 1 to 2 August and comprises one variety alone, S. Anna di Lipsia; the third group ripens from 20 August to 1 September, and comprises Panse Precoce, Delizia di Vaprio, Regina dei Vigneti (Queen of the Vineyards) and Lord Rothermere; the fourth group, ripening in September, contains Littorio and Moscato d'Adda and the fifth, ripening in the first half of October, consists of Italia, Regina, Regina Elisabetta, Conte Rosso, and Moscato d'Amburgo (Hamburg Muscat). The varieties of the first-early group all have muscat flavour but are less attractive in appearance than the other groups; this is a defect which may possibly be remedied by further breeding. It is mentioned that several new varieties in the second early class are under observation and may soon be added to the list of recommended varieties.
None of the recommended varieties requires thinning of the bunches.

1220. Dalmasso, G. 634.835:575"793"(45)
Un simpatico vitigno il Ciliegiuolo. (**An attractive vine variety, Ciliegiuolo**).
Ital. Agric. 1946 : **83** : 549–50.

The variety Ciliegiuolo [Little Cherry] is an extremely early maturing vine confined mainly

to Tuscany but found to do well in zones of high altitude elsewhere. It yields well and produces wine of good quality; it can however also be used for dessert.

1221. Depardon, L. and
Buron, P. 634.835:575.12(44)
Les hybrides producteurs directs de vigne dans la Région du Centre. (**The direct producer vine hybrids in the Midland Region of France**).
Ann. Agron. 1946 : **16** : p. 413.

This paper deals with a number of hybrids between American and French vines which combine the disease resistance of the former with the production of wine having the characteristic qualities of that produced by the latter. All these hybrids are reported to show a high degree of resistance to mildew and to meet the demands of both the peasants and the vine growers. The quantity of wine which they produce each year is, however, stated to be less on the average than that produced by the original French vines.

Methods are outlined for making wine under carefully controlled conditions so as to arrive at a true comparison of the merits of different samples of grapes. It is claimed that the wines obtained by these methods are absolutely comparable as to alcohol content, total acidity and dry extract. The results of tests on twenty-four different varieties of vines are tabulated under these headings and marks are also awarded for flavour. An account is given of the characteristics of sixteen hybrids which can be grown successfully in the midland region and which can be recommended for their good qualities.

1222. Rui, D. 634.835:575.127.2:581.6(45)
Gli ibridi produttori diretti a Conegliano. (**The direct producer hybrids at Conegliano**).
Ann. Staz. Sper. Vitic. Enologia Conegliano 1944–45 : **12** : 179–84.

Earlier work on the subject (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1313) had shown that some direct producers might possess a certain amount of interest at least for limited cultivation and would repay further study. Renewed interest in them has been observed since the end of the war, and the results are here presented of observations made on the large collection of hybrids at the Conegliano viticulture station during the six years 1940 to 1945. Observations were made on fruit colour, time of opening of buds, vegetative vigour, reaction to *Peronospora*, *Oidium* and other diseases, yield, time of ripening and flavour, and analyses were made of both the must and wine. The results are fully tabulated and descriptions are given of the most promising varieties. The three varieties considered the best among those tested were Oberlin 701, Seibel 51–78 and Seibel 100–96, and the conclusion is reached that if only varieties such as these, or others recommended by the station from time to time, are grown, quite satisfactory results can be expected from the use of direct producer hybrids.

1223. Manaresi, A. 634.835:575.247:575.42
La selezione clonale nella viticoltura (**Clonal selection in viticulture**).
Riv. Frutticoltura 1946 : **8** : 3–15.

The results of various authors are cited to show that differences between plants can be transmitted to their vegetative offspring, that high quality can occasionally be combined with high yield, and that considerable improvement can be effected by clonal selection, both in scion varieties and in root stocks.

1224. Pirovano, A. 634.835:576.12
Origini della vite e possibilità di raggruppamenti continentali. (**Origins of the vine and possibilities of continental grouping**).
Ital. Agric. 1943 : **80** : 61–65.

Even a brief description of some of the many existing forms of grape known among the Asiatic group shows the extraordinary diversity of type that exists in this section of the species *Vitis vinifera*. Many of them have large fruits of the type of dessert grapes rather than the type for wine making, which is prevalent among the European vines. The affinity of the Asiatic vines for American rootstocks is less than that of the European vines. These facts and the results of hybridization are regarded as evidence that the European and

Asiatic vines have originated from separate prototypes. The supposed origin from hybridization between American species such as *V. Labrusca* and *V. vulpina* is considered less probable.

1225. Olmo, H. P. 634.835:581.48:519.241.1:575(79.4)
Correlations between seed and berry development in some seeded varieties of *Vitis vinifera*.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 291–97.

The grape varieties Burgrave, Dattier, Molinera, Muscat of Alexandria, Olivette Blanche and Ribier were analysed with regard to correlations between seed weight and berry weight, the correlations between seed number and berry weight, the types of seed found in mature berries and their frequency, and the tendency to develop parthenocarpic fruit. The value of the result of the analysis as a basis for breeding large-fruited seedless varieties is examined.

1226. Jacob, H. E. 634.835–1.5(79.4)
Grape growing in California.
Circ. Calif. Agric. Ext. Serv. 1947 : No. 116 : Pp. 83.

This bulletin provides comprehensive information on the geographical grape-growing regions in California, cultural practices, diseases and pests, the varieties of raisin, table and wine grapes grown in the state, and other subjects connected with grape production. The cultivated grapes of California are mostly the European type derived from *Vitis vinifera*.

FORESTRY 634.9

1227. Stockwell, P. and
Righter, F. I. 634.97:575.12(73)
Hybrid forest trees.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 465–72.

Forest tree breeding is discussed in general, with some reference to breeding projects in the United States and other countries. The value of both the intermediate and heterotic types of hybrid forest trees is indicated, investigations in the United States being cited.

1228. Pavari, A. and
Phillippis, A. de 634.97–1.524(45)
La sperimentazione di specie forestali esotiche in Italia. Resultati del primo ventennio. (**Experiments with exotic species of forest trees in Italy. Results of the first twenty years**).
Ann. Sper. Agr. 1941 : **38** : Pp. 646.

Observations extending over 20 years are reported in this monograph and the results show that certain introduced species can be of the greatest importance in solving some of the many problems encountered in attempts to improve Italian silviculture. Among the examples mentioned are a number of disease resistant species such as *Castanea crenata*, resistant to *Phytophthora cambivora*, *Ulmus pumila* resistant to *Ceratostomella Ulmi*, red oak resistant to *Oidium* and Japanese larch resistant to canker. Other exotics are of value for special purposes, such as *Acacia saligna* for sand binding and *A. pycnantha* as a new source of tannin. In addition to this, a great number of species of both soft and hard woods are enumerated whose introduction is recommended on a wide scale owing to their general utility.

Each genus is treated in turn, exhaustive data being given regarding the distribution, habitat, introduction into other areas, method of cultivation and utilization; the individual species are then described, with details of the results obtained with them in the tests in Italy and the Italian dependencies. Finally the regions in Italy for which each of the recommended species is suited are tabulated.

1229. Natividade, J. Vieira 634.972.1:576.16:582
Subericultura; os fundamentos científicos da cultura racional do sobreiro. (**The cultivation of cork. The scientific fundamentals of the rational cultivation of the cork oak**).
Bol. Junta Nac. Cortiça, Portugal 1947 : No. 104 : 381–91.

Attempts to classify *Quercus Suber* have been conflicting, both with each other, and with the results of hybridization studies. The cytology of the species is of little assistance in

this respect, since the chromosome configurations of the various *Quercus* species possibly related to *Q. Suber* are all practically identical.
The centre of origin of *Q. Suber* is thought to be in the region of the Tyrrhenian Sea, and the date of origin is possibly in the Cretaceous. On account of the polymorphism of *Q. Suber* in Portugal and Southern Spain, a secondary centre of origin is located in the Spanish Peninsula.
A revised map of the distribution of the species is given.

1230. PJATNICKIĬ, S. S. 634.972.1:581.4:575.115
(**The inheritance of the pyramidal form of crown in the oak**).
Priroda (Nature) 1947 : No. 5 : 61–62.

Since the pyramidal crown is much desired for decorative gardening, the author investigated the genetical transmission of the pyramidal character. In 1938 he performed reciprocal pollination between the pyramidal oak and the ordinary oak with a lax crown. The ♀ ordinary x ♂ pyramidal resulted in a setting of 13%; ♀ pyramidal x ♂ ordinary, in a setting of 4%. Of the seedlings, now 8 years old, from the former cross, 54% were pyramidal and 46% ordinary; from the latter, 50% bore the one, and 50% the other character.
The female flowers had been carefully isolated, and the results are not considered to have arisen from imperfect pollination. It is therefore concluded that the pyramidal character is dominant, and that the pyramidal oak is heterozygous with respect to this character.
I. Z.

1231. HOUTZAGERS, G. and 634.972.3:575.127.2(44)
BURGER, F. W. 634.972.3:575.242(44)
De populier in Frankrijk. (**Poplars in France**).
Tijdschr. Ned. Heidemaatsch. 1947 : **58** : 257–63.

A knowledge of three groups in the genus is important for the study of those poplars that are of interest for cultivating. In contrast to the aspens, with the Picardy poplar (grisard) as an intermediate, are the balsam poplars of which most varieties are only of interest as possible parents of hybrids. Attention should be paid principally to the group of black poplars amongst which two main varieties are distinguished in Europe, *Populus nigra* L., the indigenous black poplar and the American species *P. deltoides* Marsh. with its varieties. Crossing between *P. nigra* and the imported *P. deltoides* and their hybrids has given rise to a group of "Canadian" poplars, which name is to be replaced by separate specific names to avoid confusion of types with greatly differing characteristics.
P. deltoides Marsh. comprises a northern variety *monilifera* Henry and a Southern variety *missouriensis* Henry, also called *P. angulata*, although it is by no means certain that the variety occurring in southern Europe under that name is identical with *P. deltoides* var. *missouriensis*. Henry considers it to be a European mutation; but it may be merely an extreme southern variation of var. *missouriensis*.
The most important hybrids are *P. serotina* Hartig (male), *P. marilandica* Bosc. and *P. regenerata* Henry (both female), and *P. gelrica* Houtz. which is nearly always male. "Improved" varieties of *P. serotina* and *P. regenerata* are known as *P. "erecta."* There is also the male hybrid *P. robusta* Schneider.
Notes on these forms and their habits in France are given, and the objects of the International Poplar Congress are described. C. B.

1232. PELKWIJK, A. J. TER and 634.972.3–2.3–1.521.6(49.2)
BRINK, G. 634.972.3–2.48–1.521.6(49.2)
Verslag van het onderzoek 1943–1945 en 1946 naar den populierenkanker. (**Investigations on poplar canker 1943-1946**).
Meded. Ned. Heidemaatsch. 1946 : No. 2 : Pp. 21.

The authors assume that cankers are caused by bacteria. The suggestion that *Pseudomonas rimaefaciens* is the causal organism appears to be incorrect. Results of inoculations are given, and of reaction to soils and manures and of susceptibility of different species of interspecific hybrids. *Cryptorrhynchus lapathi* L. is suspected of being a vector of the disease. Attention is drawn to the attack of the fungus *Dothichiza populea* Sacc. et Br. on some species.
The descriptions under figures 1a and 1b are transposed. C. B.

1233. 634.972.3–2.48–1.521.6:575.127.2(49.2)
Verslag der directie over de jaren 1943, 1944 en 1945. (**Report of the Board for the years 1943, 1944 and 1945**).
Meded. Ned. Heidemaatsch. No. 1 : Pp. 48.
Work on interspecific poplar crosses was regularly continued under the direction of the Dutch Heathland Society in co-operation with Prof. Honing, and some 900 new seedling offspring of 17 different crosses were grown. The largest—many of the offspring of *P. tremula* pollinated with various types of the Aigeiros group were already five feet tall—will be tested in 1944, when less than a year old, for susceptibility to canker.
The work of the Society was completely disorganized in 1944, but by the end of 1945 all services were functioning normally although incompletely. C.B.

1234. Goarant, L. 634.972.7:581.6
Notes sur une dégustation de tisanes de quelques espèces de tilleuls. (**Notes on a tasting of beverages of some lime species**).
Rev. Hort. Paris 1944 : **29** : 114–15.
Data are presented concerning the characteristics of beverages from seven *Tilia* species.

1235. Carter, J. C. 634.972.8:575.061.633
Inheritance of foliage variegation in variegated English elm.
Trans. Ill. Acad. Sci. 1946 : **39** : 43–46.
Data are given on the variegation of the foliage of 18 seedlings grown from a single parent tree of *Ulmus procera* var. *argenteo-variegata* (West.) Rehd. Nine of the seedlings produced normal green foliage; the remaining nine seedlings developed variegated foliage with a mosaic arrangement of green and white tissues; the amount of variegation developed varied among the seedlings. It is thought that the variegation is a cytoplasmically inherited character.

1236. 634.975:575.127.2(79.4)
New hybrid pine is promising.
44th Rep. S. Dak. Hort. Soc. 1947 : 96–97.
A note is given on a fertile hybrid between the knobcone pine (*Pinus attenuata*) and Monterey pine (*P. radiata*), developed at the Institute of Forest Genetics, Placerville, California. The knobcone pine grows at an altitude of 3000 feet and is cold resistant; the Monterey pine grows under the warm climatic conditions of the coast; the hybrid combines the cold resistance of the former species with the rapid growth of the latter.

1237. Martínez, M. 634.975:582(72)
Los *Cupressus* de Mexico. (**The *Cupressus* species of Mexico**).
An. Inst. Biol. Univ. Méx. 1947 : **18** : 71–149.
A detailed taxonomic account of the Mexican species of *Cupressus* is given.

VEGETABLES 635

1238. Graham, T. O. and Shoemaker, J. S. 635(71.3)
Vegetable varieties and hybrids.
Bull. Ont. Agric. Coll. 1947 : No. 451 : Pp. 91.
Varieties of many different kinds of vegetables are described which are suitable for cultivation in Ontario.

1239. 635(82)
Cartilla de huertos escolares y familiares. (**Guide to commercial and private nursery gardens**).
Publ. Misc. Minist. Agric. Nac. B. Aires 1946 : No. 227 : Pp. 91.
Short descriptions are included of the more important Argentine vegetable varieties.

1240. BANGA, O. 635:575:061.6(49.2)
Ontstaan en opzet van het Instituut voor de Veredeling van Tuinbouwgewassen. (**Origin and setting up of the Institute for Breeding Horticultural Crops**).
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 5th Mtg 21 July, 1945 Wageningen No. 45/1 : 29–34. (Mimeographed).

This is a brief history of the Institute from its conception in 1935 to its institution in October, 1943. Although set up by government, its committee consists entirely of members of the trade. Nevertheless it remains under the control of the Department of Agriculture and Fisheries. Its purpose is threefold: (1) breeding research; (2) examination of the characteristics of new varieties for the Register; (3) examination of cultivation value of new varieties for the Register.

Although it will eventually deal with all horticultural crops, initially it will only handle fruit and vegetables, of which the latter are the most prominent at present. Since 1936 work has been carried on to inventory, classify and describe existing varieties. C.B.

1241. 635:575:608.3(49.2)
Nieuwe rassen. (**New varieties**).
Fruitteelt 1947 : **37** : p. 388.

In Holland, the registration of a new variety of horticultural crop by the Board for Breeder's Patent Rights [Raadvanhet Kwekersrecht] must be regarded only as a guarantee of novelty, and must not be used as a form of advertisement for the particular variety or race.

1242. 635:581.143.26.035.1(48.1)
BREMER, A. H. 633.4:581.143.26.035.1(48.1)
Daglengd og grønsakdyrking. (**Length of day and vegetable growing**).
Meld. Stat. Forsøksgard Grønsakdyrking Kvithamar i Stjørdal 1943 (1944) : **24** : G5–48.
Meld. Hagebruket 1943 (1944).
Tillegg G til Landbruksdirektørens årsmelding 1943.

Interest in the influence of length of day upon plant growth was stimulated in Norway in 1860, following the work of F. C. Schübeler on the subject.

The present paper, which is illustrated, records the results of numerous experiments conducted in Norway on the effects of long and short day upon lettuce, beans, spinach, root crops, onions and various salad plants, herbs, etc., and concludes with a classification of the 34 species and varieties tested into short day, long day and neutral types on the basis of the experimental results.

The possible bearing of such work on the raising of forced radishes, turnips, chervil and fennel is also being studied.

The bibliography includes many references to Norwegian work on the subject.

1243. SEELYE, G. D. 635–1.531.12(73)
The number of vegetable seeds per unit weight.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 391–97.

Samples of seeds of beet, carrot, celery, onion, radish, tomato, cucumber, lettuce, snap bean, sweet corn, spinach and water melon varieties and strains were analysed to determine the variation in the number of seeds per ounce in relation to source of the seed, variety, strain and year. The results point to the desirability of investigations to determine the effect of environmental conditions of seed production upon the size of seed, in addition to longevity, germination and the other factors affecting the quality of vegetable seeds, which are generally studied.

1244. 635–1.531.12:578.08(48.1)
ROLL-HANSEN, J. 633.4–1.531.12(48.1)
Frøavl nordenfor Dovre. (**Seed raising north of the Dovre district**).
Meld. Stat. Forsøksgard Grønsakdyrking Kvithamar i Stjørdal 1943 (1944) : **24** : G49–64.
Meld. Hagebruket 1943 (1944).
Tillegg G til Landbruksdirektørens årsmelding 1943.

The earliest record on vegetable cultivation in Norway was written 700 years ago by the

Archbishop Jons Christenret. Seed production is the subject of a manuscript which was written by Olav Naeves during 1725–65 and which can still be regarded as sound in principle and is therefore quite suitably cited as an introduction to the practical results of recent experimentation at Kvithamar on methods of seed production in the northerly parts of Norway. Good illustrations amplify the text.

1245. WELCH, J. E. and GRIMBALL, E. L. (JUN.) 635.13:581.162.51:575
Male sterility in the carrot.
Science 1947 : **109** : p. 594.

The discovery of a male-sterile carrot plant is reported. Its F_1 progeny segregated for male sterility, but the mode of inheritance of the character was not determined. Varying degrees of apparent male sterility were detected in four plants belonging to other breeding lines. The utilization of male sterility in plant breeding is briefly discussed.

1246. CHOPINET, R. 635.15:575.127.5:633.853.49:576.356
Hybrides intergénériques *Raphano-Brassica*. (**Intergeneric *Raphano-Brassica* hybrids**).
Rev. Hort. Paris 1944 : **29** : 98–100.

The literature on *Raphano-Brassica* hybrids is briefly reviewed and other intergeneric and interspecific crosses referred to.
At the Agricultural Research Centre of Provence, tetraploid *Raphanus sativus* L. var. *niger* Pers. has been crossed with diploid *Brassica Napus* L. var. *arvensis* (Lamk) Thellung and seven hybrids obtained. Their morphological character, meiotic behaviour and fertility are described and discussed.

1247. CALZECCHI-ONESTI, A. 635.25:575(45)
La coltura della cipolla. (**Onion cultivation**).
Ital. Agric. 1946 : **83** : 45–59.

In the section on breeding in this general account of onion growing in Italy the main characters for which selection is practised, and the main characters according to which the existing races of onions are distinguished are enumerated, the chief Italian varieties being described and illustrated.

1248. 635.25:575(75.5)
PARKER, M. M. 635.347:575
Kale and onion breeding improvement program.
Virginia Fruit 1947 : **35** : No. 10 : p. 23.

The kale breeding and selection programme of the Virginia Truck Experiment Station is briefly described. Mention is made of the Cold Resistant Dwarf Blue Curled Scotch kale resulting from this work.
Onion breeding is in progress.

1249. LEVAN, A. and TJIO, J. H. 635.25:576.356:581.04
Chromosome fragmentation induced by phenols.
Hereditas, Lund 1948 : **34** : 250–52. (Abst.)

The effects on mitosis in root tips of *Allium Cepa* of treatment with different concentrations of phenol and of the various dihydroxybenzenes and trihydroxybenzenes are described. They included chromosome damage resembling that caused by X-rays.

1250. ANDERSEN, S. 635.25:581.162.51:575.182:575
A new and better onion is born—maybe.
Fm Home Sci. Utah 1947 : **8** : No. 3 : 10–11.

A popular account is given of the use of the male-sterile character in onion breeding; reference is made to the improved Sweet Spanish developed by this method.

1251. JONES, H. A. and
CLARKE, A. E. 635.25:581.162.51:575.182:575.125(73)
The story of hybrid onions.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 320–26.
The production of F_1 hybrid onions by making use of cytoplasmic male-sterility is described (cf. *Plant Breeding Abstracts*, Vol. XV., Abst. 766).
Breeding is in progress to develop hybrids possessing resistance to thrips, downy mildew, pink root and other diseases.

1252. MURAIAMA, S. J. 635.26–2.452–1.521.6(81)
Alho "Caiano Roxo". (**Caiano Roxo garlic**).
Rev. Agric. Brazil 1947 : **22** : 60–62.
A garlic variety Caiano Roxo is outstandingly resistant to rust. A description of it is given.

1253. 635.32:575.74(65)
FREZAL, P. 635.32–1.521.5(65)
L'abâtardissement de l'artichaut. (**The degeneration of the artichoke**).
Direct. Agric. Gouvern. Gen. de l'Algérie 1947 : p. 8.
The value of selection in reducing or suppressing the tendency of artichoke crops to become heterogeneous is discussed.

1254. BANGA, O. 635.34:575(73)
Sluitkoolproblemen in Amerika. (Teelt, veredeling en zaadteelt). [**Cabbage problems in America. (Cultivation, breeding and seed production)**].
Meded. Inst. Vered. Tuinbouw. Wageningen 1946 : No. 3 : Pp. 43.
This is the first report of a trip to U.S.A. during the winter of 1945–6 to study the progress of plant breeding in horticultural crops. The statistics of the industry are given, and the cultivation and choice of varieties in the different zones are described. The influence of temperature on the different growth phases is discussed, as is also in considerable detail the cabbage seed industry, with special attention to the seed industry in the States of Washington and California.
The sections of the report relating to plant breeding deal with the selection of new early varieties, resistant to bolting and with *Fusarium* wilt resistance, inbreeding to obtain homozygosity of disease resistance factors, bud pollination, back crossing, resistance to heat and *Plasmodiophora*, vitamin C content and heterosis. C. B.

1255. HEINZE, P. H. 635.34:581.165.72:577.17(75.7)
The use of growth-regulating substances in the propagation of cabbage from cuttings.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 309–14.
In cabbage breeding investigations at the United States Regional Vegetable Breeding Laboratory a technique has been devised by means of which cuttings from heads selected in the spring crop can be rooted and kept growing through the summer, seed being produced in the following spring. Naphthaleneacetic acid and indolebutyric acid have been found useful for the induction of roots in the cuttings. It is suggested that the application of growth substances in the dust form with fungicides as carriers has the advantages of saving time and of ease in handling.

1256. COOK, H. T.,
NUGENT, T. J.,
PARRIS, G. K. and
PORTER, R. P. 635.41–2.484–1.521.6:575.42(75.5)
***Fusarium* wilt of spinach and the development of a wilt resistant variety.**
Bull. Va Truck Exp. Sta. 1947 : No. 110 : 1810–20.
An account is given of the *Fusarium* wilt disease of spinach. A wilt resistant strain has been selected from the Virginia Savoy variety, and released commercially.

1257. HOWARD, H. W. and MANTON, I. 635.56:576.356.5:582
Autopolyploid and allopolyploid watercress with the description of a new species.
Ann. Bot. 1946 : N.S. **10** : 1–13.

Autopolyploid forms of watercress were obtained by treating the cotyledons of young diploid seedlings with 1% aqueous colchicine. The autotetraploids resembled the diploid watercress far more closely than the wild tetraploid.

Diploid, wild tetraploid and autotetraploid strains were selfed, and crossed in all possible combinations. The autotetraploid produced 26 large good seeds per fruit, the wild tetraploid 29 such seeds and the autotetraploid 11 per fruit. Out of the cross-pollinations attempted only the combinations wild tetraploid x diploid and autotetraploid x wild tetraploid gave rise to viable seeds. Plants grown from seeds of the latter combination, which is termed "hybrid tetraploid," were intermediate between the two parents. Their seed fertility was extremely low, suggesting that the wild tetraploid is an allopolyploid.

Cytological investigations of meiosis provided conclusive evidence of the allopolyploid nature of the wild tetraploid. The data obtained on meiosis indicated the following genomes: diploid watercress, AA, where A represents the 16 chromosomes of the gametic set; wild tetraploid, AABB, where B represents the 16 chromosomes of the gametic set of some other at present unidentified crucifer; autotetraploid, AAAA; and hybrid triploid, AAB.

The chromosome numbers recorded in the progeny derived from self-pollinated wild hybrid triploids, the back-cross triploid ♀ x diploid ♂ and the cross triploid ♀ x wild tetraploid indicated considerable tolerance to unbalance.

All the plants resembled normal types of *Nasturtium officinale*, although most were misshapen. As expected their seed fertility was low. A number of the plants, however, flowered profusely, and gave 2–13% good seed. One plant with $2n = 39$, originating from the wild triploid selfed, produced 30% good seeds. The evolutionary significance of this behaviour of the triploid with regard to chromosome unbalance is discussed.

The morphology of the wild diploid, tetraploid and triploid types is described. The name *N. uniseriatum* is proposed for the wild tetraploid. The wild diploid and triploid forms are analysed under the names *N. officinale* R.Br. and *N. uniseriatum* x *officinale*, respectively. It is suggested that possibly the other half of the wild tetraploid originated from a species of *Cardamine*.

1258. SHAW, H. K. A. 635.561:576.356.5:582
The botanical name of the wild tetraploid watercress.
Kew Bull. 1947 : No. 1 : 39–43.

Information is given on some probable earlier synonyms of *Nasturtium uniseriatum* Howard et Manton (cf. Abst. 1257). The earliest of these synonyms is *N. microphyllum* Boenninghausen ex Reichenbach (1832). The author recommends that the wild tetraploid watercress should be known under this name, pending evidence to the contrary.

An appendix gives a translation of a paper by Irmisch, published in 1861, which describes two varieties of watercress, viz. *N. fontanum* var. *longisiliqua* and var. *brevisiliqua*, the former being the tetraploid watercress.

1259. WHITAKER, T. W. and PRYOR, D. E. 635.61:581.162.3:578.08(79.4)
Effect of plant-growth regulations on the set of fruit from hand-pollinated flowers in *Cucumis melo* L.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 417–22.

A study was made of the effect of indoleacetic acid, indolepropionic acid, indolebutryric acid, naphthalene acetamide and other substances upon the fruit set of artificially pollinated flowers of *C. Melo*. It was found that an increase of about 22% in the fruit set was obtained by the application of 4-chlorophenoxyacetic acid to the flowers after pollination, a result which is of practical value in breeding work on this species.

1260. Simonneau, P. 635.61:581.6:575.74(65)
La culture irriguée des melons et des pastèques en Oranie Orientale. (**Irrigated cultivation of melons and water-melons in Eastern Oran**).
Bull. Inspection Gén. Direction Agric. de l'Algérie 1946 : No. 132 : Pp. 38.
Four melon varieties cultivated in Oran, and the Algerian water-melon are described. The degeneration of varieties due to cross fertilization and the prevention of this by selection and isolation are discussed.

1261. Hutchins, A. E. 635.62:581.6:575(77.8)
A new family-size squash, the "Rainbow".
Minn. Hort. 1947 : **75** : No. 1 : 5–6.
The squash variety Rainbow was produced at Minnesota Agricultural Experiment Station by inbreeding, for five generations, selections from the F_2 of a cross between the varieties Greengold and Banana. Rainbow has given satisfactory results in many different parts of Minnesota. It is long, nearly cylindrical and tapering at the apex, its polar and equatorial diameters being 14 and 4 inches respectively. In colour, it is pink with grey-blue splashes or stripes particularly accentuated at the blossom end, changing to creamy pink in storage. The shell is of medium hardness and is about $\frac{1}{8}$ inch in thickness, and smooth. The flesh which is 1 to $1\frac{1}{4}$ inches thick is edible to the shell, fine in texture and moderately dry, of good quality and light orange-yellow in colour. The pulp and seed constitute about 13% of the weight of the fruit, which averages three to four pounds. Four to six fruits per plant were produced in 1946 and the yield per plant was 10 to 21 pounds. The fruits mature after about 100 days. In storage, Rainbow kept as well as Banana. The vine growth is small. Yield data of other squash varieties are presented for comparison.

1262. Barnes, W. C. 635.63:575:578.08(75.7)
Cucumber breeding methods.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 227–30.
An account is given of the techniques of planting, pollination, selection, harvesting and seed extraction which have been valuable in cucumber breeding at the Clemson College Truck Experiment Station, Charleston, South Carolina.

1263. Bremer, A. H. 635.63:575.12(48.1)
Sortsval i rot- og grønsaker. (**The choice of varieties of root crops and vegetables**).
Meld. Stat. Forsøksgard Grønsakdyrking Kvithamar i Stjørdal 1941 (1942) : **22** : G 5–30.
Meld. Hagebruket 1941 (1943).
Tillegg G til Landbruksdirektørens årsmelding 1941.
In the light of recent trials, a revised survey is given of varieties of root crops and vegetables in cultivation in Norway: cucumbers and gherkins for pickling and salting; beets of various types; beans, including French beans, snap beans, beans for slicing, wax beans, and scarlet runners; and sugar, shelling and marrow fat peas.
Since 1934 selection has been in progress with hybrids between the varieties of gherkins (cucumber varieties) Muromsk druve [Muromsk Grape] and Rinsk druve [Rhenish Grape] to obtain a longer and larger type than Muromsk druve but equally luxuriant. Two selections are now being multiplied up, No. 10 (Kvithamar druve) and the hybrid line, No. 3b. No. 10 is as early as Muromsk druve which it also equals in yield; its fruits are longer, and, if allowed to continue growing, can be used for salting, as well as pickling; the colour is not so dark as might be wished.
No. 3b is a small type of plant which flowers abundantly and early and has small oval fruits. It might be suitable for more northerly districts.
For observations on the uses of these varieties and how to raise seed from them see Abst. 1266.
The section on beets deals with different types and varieties, mostly well known, of beet and Swiss chard, and their uses, with some observations on bolting tendency and sugar content.

Among the various foreign and other pea varieties, the writer recommends the Korthamar, short snap, sugar pea which has large pods and wrinkled seeds and has given good yields in the present trials.
Suitable varieties of cabbage, cauliflower, brussels sprouts, swedes, and leeks for Norway are also briefly discussed.

1264. Tkačenko, N. N. 635.63:575.125:581.162.3:578.08
(The technique of artificial pollination in producing heterotic seed of cucumber).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 11–12 : 72–74.

The F_1 hybrids between varieties of cucumber often attain maturity earlier than the uncrossed parents and therefore the factories can make use of them before the main crop of tomatoes and sweet corn which comes about mid-July. One hybrid at the Majak breeding station in the Crimea produced 28·7 c. per ha. of gherkins by 6 July, whereas the parent varieties had produced only 9·4 c.; on 16 July the respective yields were 78·7 c. and 48·2 c. per ha.
Experience has shown that the distance covered by pollinating bees is so small that even when two varieties are sown adjacent the amount of interpollination is relatively small, in consequence of which artificial hybridization is thought to be the only effective way of producing hybrid seed for growers. The method proposed is to cut the corolla on the day before it opens, the cut being made just above the level of the stigma, which is then pollinated. Bees do not visit flowers with cut petals and the need for bagging is therefore obviated. Using this method it is calculated that 250 pollinations per day can be made, producing 1·5–2·0 kg. of crossed seed.
A similar method is apparently applicable to *Cucurbita maxima* Duch.

1265. 635.63:575.42(48.1)
Bremer, A. H. and 635.34.00.14(48.1)
Roll-Hansen, J. 633.426.00.14(48.1)
Litt om grønnsaksortimentet. **(A note on the available collection of vegetables).**
Meld. Stat. Forsøksgard Grønsakdyrking Kvithamar i Stjørdal 1942 (1944) : **23** : G5–13.
Meld. Hagebruket 1942 (1944).
Tillegg G til Landbruksdirektørens årsmelding 1942.

Further information (cf. Abst. 1263) on the Kvithamar druve [Kvithamar Grape] cucumber, its qualities and the effects of continued family selection carried out to maintain the desirable type obtained by hybridization is given.
In 1942 and 1943 the Kvithamar druve was compared with Muromsk, Rhinsk, Spångberg druve [Spångberg Grape], Russisk and Robusta in trials at Kvithamar and Fossnes. At Kvithamar, Kvithamar druve ranked first for yield in both years and Spångberg, Muromsk and Rhinsk came next. At Fossness in 1943, Kvithamar and Muromsk were equal in yield, Russisk and Rhinsk a good deal below them, and Robusta, the latest maturing, and a larger, preserving type plucked for pickling, in this case, was well below the latter two. In 1943, Kvithamar, Muromsk and Spångberg were the earliest as well as the highest yielding. As a preserving cucumber Robusta is the earliest and the most productive.
A few other kinds also gave good yields, e.g., the Venloer druve [Venlo Grape] for pickling and the Cavallius type for pickling and for salting; both are being further tested.
Swede trials with 28 strains were also undertaken during 1941–43 and are to be continued in 1944. The present preliminary report gives details of the performance of Norwegian, Swedish, Finnish and other varieties.
In curly cabbage trials of the Norwegian variety Halvhøg ekstra Moskrusa, a synonym of Halvstammet extra moskruset [medium-tall extra curly-moss] maintained its place as the best yielder and showed 50% or a little over 50% of leaf in the total weight of plant harvested.

1266. Bremer, A. H.,
Soelberg, C.,
Brandtsegg, O. and
Roll-Hansen, J. 635.63–1.531.12(48.1)
Frøavl. (**Seed production**).
Meld. Stat. Forsøksgard Grønsakdyrking Kvithamar i Stjørdal 1941 (1942) : **22** : G 38–64.
Meld. Hagebruket 1941 (1943).
Tillegg G til Landbruksdirektørens årsmelding 1941.

The first part of this paper by Bremer and Soelberg dealing with methods of raising seed of gherkins and cucumbers (*Cucumis sativus* L.) for pickling and preserving is treated under the following heads: flowering, pollination and seed yield; choice of varieties for Norwegian conditions; élite seed production in frames from cucumbers grown in the open; raising bulk seed; and harvesting.

The second part of the paper by Brandtsegg and Roll-Hansen gives advice on the production of seed of cabbages, swedes, carrots, Nantaise Early turnips, beans of various kinds, and leeks, in the Trøndelag. Illustrations explain the various procedures.

1267. Muraiama, S. J. 635.64(81)
Variedades de tomates. (**Tomato varieties**).
Rev. Agric. S. Paulo **1947** : **22** : 100–02.

The important tomato varieties grown in Brazil are briefly described.

1268. Harper, R. S. 635.64:575(94.5)
"Tatinter" A new Victorian tomato suitable for processing and marketing.
J. Dep. Agric. Vict. **1947** : **45** : 519–24.

The new tomato variety Tatinter has been developed at the Tatura Horticultural Research Station, Victoria, from a selection believed to be a chance hybrid between Burwood Wonder and Intermediate. It is a mid-season variety, suitable for cultivation in northern Victoria, particularly in Goulburn Valley. It is suitable for the fresh market and canning industry. In habit Tatinter is dwarf to semi-dwarf, producing high yields of medium to large dark red fruit. Malformed or compound buds are common in the first flower truss.

1269. Lesley, J. W. and
Lesley, M. M. 635.64:575.113.5.061.6
Flesh color in hybrids of tomato.
J. Hered. **1947** : **38** : 245–51.

Wild races of *Lycopersicon esculentum* and *L. pimpinellifolium* have red-fleshed fruits containing lycopene and several yellow carotenoid and other pigments; these races carry the dominant alleles *T* and *R* of tangerine (*t*) and yellow (*r*). *L. hirsutum* and *L. peruvianum* possess greenish white fruits. The inheritance of fruit colour was studied in crosses of *L. esculentum* or hybrids between *L. esculentum* and *L. pimpinellifolium* with *L. hirsutum* and *L. peruvianum* var. *dentatum*, the results being analysed on the basis of seven colour types distinguished visually in the flesh of the *L. esculentum*. The data obtained suggest that both *L. hirsutum* and *L. peruvianum* differ from *L. esculentum* in at least three genes modifying the flesh colour of the fruit. These genes appear to exert a cumulative effect tending to reduce the concentration of lycopene and to some extent also that of the yellow pigments.

1270. 635.64:575.125
Oppenheimer, C. 635.64:575"793"
(**Experiments with hybrid tomatoes**).
Hassadeh **1947** : **27** : 260–63.

F_1 combinations between seven varieties of tomatoes were produced in 1945 and additional combinations were produced in 1946. The article reports on two experimental fields containing the hybrids together with their parent varieties, one in the winter garden region and one in summer in the coastal plain. The following results have been found:—
(1) The additional yields of the hybrids in the winter garden region where generally yields are very high has been low and of no practical importance. (2) In the difficult summer

season all the hybrids have yielded better than their parents and in many cases the additional yield has been of practical importance. Thus the production of hybrid types will probably be one of the means to a marked improvement of yields in summer. (3) In the choice of parent varieties yield is not a factor of great importance, but both varieties should be of the large fruit type and they should belong to two widely different groups. The best results were found when one of the parents belonged to the dwarf group. (4) Hybrid types tend to be early, but not generally as early as the earlier parent. This differs from the statement of Lysenko that a hybrid must always be at least as early as the earlier parent. In addition the author has tried to calculate the cost of hybrid seed. For the second season of the trial it was found that 3 grm. of hybrid seed could be produced for each working hour and from each female parent plant.

1271. CURRENCE, T. M. 635.64:575.125(77.8)
Hybrid tomatoes for Minnesota.
Minn. Hort. 1945 : **73** : No. 2 : p. 21.

Results obtained indicate that hybrid vigour can be profitably exploited in increasing tomato yields by growing first generation crosses.

The best cross in the 1943 varietal test was a hybrid between Pritchard and Earliana which produced 9·61 tons per acre as compared with 7·26 for Earliana, the highest yielding variety. The cross is almost as early as Earliana, is superior to the latter in quality and is equal or superior to the standard, Bonny Best. The production of hybrid tomato seed is discussed.

1272. YEAGER, A. F. and
PURINTON, H. J. 635.64:577.16:575.127.2(74.2)
***Lycopersicon peruvianum* as a parent in the development of high ascorbic acid tomato varieties.**
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 403–05.

A single seed was obtained from the cross Michigan State Forcing (*L. esculentum*) x *L. peruvianum* P I 126946 in investigations at the New Hampshire Agricultural Experiment Station. The F_1 plant was very vigorous and apparently completely fertile. It bore long clusters of small round orange red fruits with two to three locules. The ascorbic acid content of an F_2 population of this interspecific hybrid ranged between 25 and 70 mg. per 100 grm. of fruit. A number of these F_2 plants possessing the higher values for ascorbic acid content and also comparatively large fruit were crossed with New Hampshire Victor and Red skin. Plants from the third generation of the cross between the F_2 hybrid and Redskin showed an ascorbic acid content of 43–67 mg. in field plantings; the average ascorbic acid of standard varieties was 19 mg. Some of the selections maintained a high degree of vegetative vigour. The F_1 hybrid between a selection with high ascorbic acid content and the variety New Hampshire Victor had fruits of commercial size and shape with a mean ascorbic acid content of 39 mg., in comparison with the content of 19 mg. of Comet whose fruits were analysed at the same date. It is therefore suggested that the selections derived from *L. peruvianum* might be valuable as parents in the production of F_1 hybrids, on account of the partial dominance of high ascorbic acid content.

1273. LEGGIERI, L. 635.64:581.6:575(45)
I pomodori "S. Marzano" e "Lampadina" nell' industria dei pelati. (**The S. Marzano and Lampadina tomatoes in the conserving industry**).
Ortofrutticolt. Ital. 1940 : **19** : Pp. 7.

The S. Marzano tomato has elongated, almost cylindrical fruits, with skin that is extremely easily detached, making the variety useful for conserving. The Lampadina tomato has fruits of almost the same shape but skin less easily detached, and fruit quality generally inferior to Marzano. It is more popular with the growers however because of its higher yield. Breeding work has been started with Marzano to improve its yield and other characters.

1274. PORTE, W. S. and
ANDRUS, C. F. 635.64–2–1.521.6:575(73)
Healthier tomatoes.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 312–19.
A useful review is given of tomato breeding for disease resistance in the United States.

1275. FRAZIER, W. A.,
KIKUTA, K. and
HENDRIX, J. W. 635.64–2–1.521.6:575(96.9)
Breeding tomatoes for combined resistance to *Fusarium* wilt, spotted wilt, and gray leaf spot in Hawaii.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 235 40.
Further progress in the work of developing tomato varieties with combined resistance to *Fusarium* wilt, spotted wilt and grey leaf spot is reported from the Hawaii Agricultural Experiment Station (cf. *Plant Breeding Abstracts*, Vol. XVII, Absts 913, 917, 199).
Lines have been secured which possess good resistance to all three diseases, and also promising plant and fruit characters. The type of resistance to spotted wilt in these lines is similar to that of the variety Pearl Harbor, i.e. resistance to systemic virus invasion (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 919). The degree of resistance to *Fusarium* wilt in the lines obtained is in general equal or superior to that of Pan America, which is considered one of the most *Fusarium* wilt resistant varieties at present available; complete freedom from at least some vascular *Fusarium* infection has not been found in any line. It has been observed that resistance to grey spot and resistance to *Fusarium* wilt tend to be associated.

1276. FRAZIER, W. A. and
BOWERS, J. L. 635.64–2.1–1.521.6:575(75.2)
A final report on studies of tomato fruit cracking in Maryland.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 241–55.
Fruit cracking in tomatoes was studied in relation to the varietal factor, climatic conditions, fruit growth, and the effect of the physiological age of the fruit. The experiments were carried out at the Maryland Agricultural Experiment Station. The types of tomato fruit cracking and their possible causes are discussed in detail, and it is suggested that since varietal differences in susceptibility of the fruit to crack and in the type of cracking exist, and since the climatic factors conducive to fruit cracking are largely beyond control, breeding for resistance to fruit cracking is the most likely means of overcoming this defect. The various characters which should be studied in estimating resistance to cracking are briefly considered.

1277. CRANDALL, B. S. and 635.64–2.484–1.521.6:575(85)
SWINGLE, C. F. 635.64–2.8–1.521.6:575(85)
Studies of tomato diseases in the Amazon Basin of Peru (Preliminary Report).
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 267–69.
An account is given of the work of testing introduced tomato varieties and selections for resistance to leaf mould disease (*Cladosporium fulvum* Cke) at the Agricultural Experiment Station, Tingo Maria, Peru. Among the introductions so far tested, Bay State Improved, Mold Resistant Waltham Forcing, Ohio Globelle, Improved Vetomold 121, Vetomold 121, and Vetomold from Ontario have proved the most resistant.
It is suggested that testing the leaf mould resistance of material developed in the United States and Canada should be of value to plant breeders in these countries since it is thought that at Tingo Maria strains of the fungus exist which are additional to those found at present in North America.
A virus characterized by the purpling and rolling up of the leaves, which is widespread in Bolivia and Peru, is also receiving attention in breeding work at Tingo Maria.
In addition, the wild tomatoes and *Solanum* species are being studied in connexion with the origin of tomato diseases.

1278. Watts, V. M. 635.64–2.6–1.521.6:575.127.2(73)
The use of *Lycopersicon peruvianum* as a source of nematode resistance in tomatoes.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 233–34.

Cuttings of an F_1 plant of the cross Michigan State Forcing x *L. peruvianum* P.I. 128657, secured by P. G. Smith (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 397) were obtained from the Division of Truck Crops, University of California. Three seedlings, designated Cr 2–45–1, Cr 2–45–2 and Cr 2–45–3, were produced by using pollen of this F_1 clone to fertilize various lines of *L. esculentum*; Cr 2–45–1 was only moderately resistant to nematode, but the other two seedlings were strongly resistant, clonal plants of each seedling surviving five inoculations in the course of 15 months without developing any root knots. Only Cr 2–45–2 was found to be self fertile. The progeny of Cr 2–45–2, designated Cr 3A, was tested for nematode resistance. The data obtained suggest that resistance to nematode in the early stages of plant growth is controlled by two dominant factors. The self sterile Cr 3A plants were discarded; the 14 self fertile ones were inoculated for the fourth time and placed out of doors in pots. Four of these 14 plants became seriously knotted in the summer, suggesting that it is necessary to carry out tests of nematode resistance well beyond the early stages of plant growth. In size the fruits of the ten surviving Cr 3A plants varied from 1 to 2 inches in diameter, and in colour from deep orange to bright red. In taste and flavour the fruit of these selections resembled commercial tomatoes. It is considered that it will be possible to develop varieties combining a high degree of nematode resistance with satisfactory commercial characters.

1279. Kikuta, K. and
Frazier, W. A. 635.64–2.8–1.521.6:575.127.2(96.9)
Preliminary report on breeding tomatoes for resistance to tobacco mosaic virus.
Proc. Amer. Soc. Hort. Sci. 1947 : **49** : 256–62.

The following interspecific hybrids have been tested at the Hawaii Agricultural Experiment Station for their reaction to tobacco mosaic: Pearl Harbor x *Lycopersicon hirsutum*; HES–2269 x *L. hirsutum*; Pearl Harbor x (Pan America x *L. hirsutum*); HES–2269 x [Pearl Harbor x (Pan America x *L. hirsutum*)]; T3075 [(*L. peruvianum*–Michigan State Forcing) x *L. pimpinellifolium*) x *L. hirsutum*]; HES–2269 x [(*L. peruvianum* x Michigan State Forcing x *L. pimpinellifolium*) x *L. hirsutum*]; T3074 [(*L. hirsutum* x Bonny Best) x Pearl Harbor x *L. pimpinellifolium*–*L. esculentum*–*L. chilense*] x T3075 [(*L. peruvianum*–Michigan State Forcing) x *L. pimpinellifolium* x *L. hirsutum*]; and Pearl Harbor x (*L. esculentum* x *L. pimpinellifolium* x *L. chilense*).

L. hirsutum remained symptomless. In the F_1 hybrids between *L. esculentum* and *L. hirsutum* the apparently symptomless tolerance of the latter species was incompletely dominant in the F_1 generation. Six individual segregates from the cross *L. esculentum* (HES–2269) x [(*L. peruvianum* x Michigan State Forcing x *L. pimpinellifolium*) x *L. hirsutum*] showed a sufficiently high degree of tolerance to tobacco mosaic for further use in breeding for resistance to this disease.

1280. Chouard, P.,
Guedron, P. and
Mariscal, R. 635.64.00.14(44)
Nouveaux essais préliminaires sur la normalisation de la culture et des variétés de tomates. (**New preliminary experiments on the standardization of the cultivation of tomatoes and of tomato varieties**).
C.R. Acad. Agric. Fr. 1947 : **33** : 523–26.

A preliminary note is presented concerning the results of tests of 82 new tomato varieties carried out in France.

1281. Walker, W. F. 635.64.00.14(94.6)
Description of tomato varieties under trial in Tasmania.
Tasm. J. Agric. 1947 : **18** : 141–48.

Notes are given on the performance of about 100 tomato varieties which have been tested in Tasmania during recent years. The following varieties are recommended: Australian

Earliana, Bounty, Buckley's Prolific, Burwood Wonder, Canner 114, Crimson Belle, Grosse Lisse, Kondine Red, Orange Prolific, Potentate, Rouge de Marmande, Salads Special, South Australian Dwarf, Tatinter, Vetomold and Wilding's Prolific. Further trials of some varieties, and trials of additional varieties and many promising hybrid selections developed by the Tasmanian Department of Agriculture are to be carried out.

1282. JAUCH, C. 635.651–2.484:576.16:631.521.6(82)
La "mancha chocolate" de las habas. (**Chocolate spot of broad beans**).
Rev. Invest. Agric. B. Aires 1947 : **1** : 65–80.

The chocolate spot disease of broad beans in the neighbourhood of Buenos Aires is caused by *Botrytis Fabae*, of which two biotypes, A and B, have been differentiated, and *B. cinerea*. The varieties Agua Dulce [Fresh Water], Argentina, del Pais [Native], de Sevilla and Windsor are each susceptible to attack by either species of *Botrytis*.

1283. HASTINGS, W. R. 635.652:575(73)
1948 A—As release ready.
Sth. Seedsman 1947 : **13** : No. 12 : p. 18.

The new Supergreen bush snap bean variety, temporarily known as Sensation Greenpod, is to be commercially released. It has been developed by crossing Idaho Refugee with Full Measure and back-crossing to the latter variety, by Roger Bros, Seed Co., Illinois. The new variety is medium or slightly late in maturity; it is high-yielding and resistant to mosaic. The article also mentions the Victory Freezer and Freezonian peas, the Puregold Wax, Ranger and Cherokee snapbeans, and Peerless Lima bean (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1790).

The Excel Yellow Bermuda onion is recommended for the southern states; it has been developed by H. A. Jones, United States Department of Agriculture, Beltsville, Maryland.

1284. RÍOS, P. G. and RIOLLANO, A. 635.652:575.42(72.95)
The improvement of native white beans (*Phaseolus vulgaris*) by selection.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 425–36.

A description is given of the work of selecting the native white bean, which was begun at the Puerto Rico Agricultural Experiment Station in 1936. The investigations have culminated in the production and distribution of the improved varieties Nos 1329 and 1632. Both varieties are superior in yield and cooking qualities, No. 1329 ranking second highest among the selections tested in protein content (26.79%); it also has a high fat content (1.51%), and the lowest fibre content among all the selections analysed.

1285. VILMORIN, R. DE 635.652:578.088(44)
Etude des caractères du haricot (*Phaseolus vulgaris* L.) en vue de l'établissement d'une classification agronomique. (**Study of the characters of the French bean (*Ph. vulgaris* L.) in view of the establishment of an agronomic classification**).
C.R. Acad. Agric. Fr. 1947 : **33** : 511–16.

The morphological and physiological characters to be taken into account in distinguishing between different varieties of *Ph. vulgaris* are discussed.

1286. ZAUMEYER, W. J. 635.652–2–1.521.6:575(73)
Control of bean diseases.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 333–37.

The article includes an account of the rust (*Uromyces Phaseoli* var. *typica* Arth.) resistant pinto bean varieties, Pinto No. 5 and Pinto No. 14, released in 1946 (cf. *Plant Breeding Abstracts*, Vol. XVII., Abst. 387). Reference is also made to the disease resistant Pioneer, Florida Belle and Logan snap beans, and the disease resistant Florida White Wax, Cooper Wax and Ashley Wax bush wax bean varieties (cf. *Plant Breeding Abstracts*, Vol. XIII, Absts 1415 and 1417).

It is mentioned that the development of bean varieties resistant to common and halo blights is in progress.

1287. Shirlow, N. S. 635.652–2–1.521.6:575(94.4)
Richmond Wonder French bean. A new, heavy-yielding, disease-resistant variety.
Agric. Gaz., N.S.W. 1947 : **58** : p. 459.
The new French bean variety Richmond Wonder has been developed from the cross Clarendon Wonder x Wellington Wonder, at the Hawkesbury Agricultural College, New South Wales. The new variety is resistant to halo blight and angular leaf spot. Its plants have no runners when mature, and crop heavily over a fairly long period. The pods are large and fleshy, developing somewhat heavy string and fibre with age. Richmond Wonder possesses a better cropping capacity than Hawkesbury Wonder in hot weather.

1288. Blood, H. L. 655.652–2.8–1.521.6:575(73)
Vegetable and seed production limited by disease.
Fm Home Sci. Utah 1947 : **8** : 8–9, 18–19.
Reference is made to attempts to introduce curly-top resistance into acceptable strains of dry and snap beans, and to develop mosaic resistant types in Western U.S.A.

1289. Hurwitz, S. and Goldin, A. 635.654:575.42(56.9)
(Selection in the Whip-poor-will cowpea).
Hassadeh 1947 : **27** : 310–12.
The variety Whip-poor-will was first introduced into Palestine in 1934 from California. This and later introductions from other parts of the U.S.A. and from South Africa were found to be lacking in uniformity in important characters. A number of lines were grown from individual plants selected in 1938. After seven years of trials under controlled conditions, three lines were finally selected as superior to the unselected population, in yield and other characters, and will be distributed through the Seed Growers' Association.
C. O.

1290. Brittingham, W. H. 635.654:578.088
A key to the horticultural groups of varieties of the southern pea, *Vigna sinensis*.
Proc. Amer. Soc. Hort. Sci. 1946 : **48** : 478–80.
A key is presented for the field identification of 13 horticultural groups of varieties of *V. sinensis*.

1291. Ryzhikov, N. [Ryžikov, N.] 635.655(47)
Utilization and cultivation of soybeans in the U.S.S.R.
Soybean Digest 1947 : **7** : No. 12 : p. 12.
A brief account is given of soya bean production in the Soviet Union.
The importance of adapted varieties for the different regions is stressed. Some of the most important varieties cultivated at the present time are given as follows: Amurskaya Zheltaya 041 and 042, Ussuriiskaya 029, Staroukrainskaya, Kharkovskaya 149, Kharbinskaya 231–a and Kubanskaya 149. The variety Amurskaya Zheltaya 041 is described. It is an early ripening variety with a growth period of 107–109 days. Its seeds contain 20·6% fat and 41·8% albumen. The lowest beans of this variety grow at a height of 12–15 cm. off the ground, combine harvesting thus being facilitated. The variety is resistant to the soya moth.

1292. 635.655(73)
Improvement and industrial utilization of soybeans. Research under the Soybean Laboratory Program.
Misc. Publ. U.S. Dep. Agric. 1947 : No. 623 : Pp. 26.
The bulletin presents a useful account of the investigations on the soya bean carried out by the United States Regional Soybean Laboratory, established in 1936 at Urbana, Illinois, and the co-operating north central and southern states. The investigations include genetics, breeding, varietal testing, disease control, and physiology. Research on the utilization of the soya bean and its by-products was transferred in 1942 to the Northern Regional Research Laboratory, Peoria, Illinois. The bulletin covers technological research only up to this date.

A bibliography of the publications of the Regional Laboratory and co-operating scientists is appended.

1293. Woodworth, C. M. and
Williams, L. F. 635.655(73)
Lincoln : A midseason soybean for the North-Central States.
Bull. Ill. Agric. Exp. Sta. 1947 : No. 520 : 335–48.

This bulletin presents a detailed account of the Lincoln soya bean (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 536). Lincoln originated from a natural cross between Mandarin and Manchu made in 1934 at the Illinois Agricultural Experiment Station. An F_2 selection of this cross, strain L6–685, was tested in the uniform group trials conducted by the Regional Soybean Laboratory in co-operation with the state experiment stations, and in 1943 was named Lincoln.

A summary is given of the performance of Lincoln in the Uniform group tests during the period 1940–44. In the Group II test of mid-season and early varieties conducted in northern and central Iowa, Illinois, Indiana, north-western Ohio, north-eastern Nebraska and the southern regions of Wisconsin and Michigan, Lincoln has exceeded the widely grown Dunfield and Illini varieties by 17% average yield during the five-year period. It has also excelled in seed quality, oil percentage and iodine index of the oil; in resistance to lodging it has been second to Richland. In addition, Lincoln has given good results in the Group III tests further south. The results of the tests show that the variety is adapted to an area which produces three-quarters of the total soya bean crop in the United States.

1294. Henson, P. R. 635.655:575(73)
Soybeans for the South.
Yearb. U.S. Dep. Agric. 1943–1947 (1947) : 338–43.

Breeding work carried out in the southern states to develop improved soya bean varieties for oil production is reviewed, information being given on varieties and strains distributed in recent years.

1295. Weiss, M. G.,
Weber, C. R. and
Kalton, R. R. 635.655:575(73)
The new Hawkeye soybean.
Iowa Fm Sci. 1947 : **2** : 3–8.

The new Hawkeye soya bean variety was developed from the cross Mukden x Richland, as a result of co-operative investigations by the U.S. Regional Soybean Laboratory and the Iowa Agricultural Experiment Station. It was released in 1947 for cultivation in northern Iowa. Hawkeye gives about the same yield as Lincoln, but in tests in Iowa has out-yielded Richland. It is as early maturing as Richland, and ripens a week earlier than Lincoln. It is equal to Richland in resistance to lodging, and to Lincoln in oil content.

1296. Weiss, M. G.,
Weber, C. R. and
Kalton, R. R. 635.655:575(73)
The Hawkeye soybean.
Soybean Digest 1947 : **8** : No. 1 : 16–18.

The new Hawkeye soya bean variety is described (cf. Abst. 1295).

1297. Bulcock, F. W.,
Mullett, H. A.,
McKeon, C. J. and
Grantham, H. A. 635.655:575(94)
The soybean industry and its possible establishment in Australia. Report of the Commonwealth Mission of investigation into the industry in U.S.A.
J. Dep. Agric. Vict. 1947 : **45** : 397–414, 455–67.

The report is presented of the recent Australian mission to the United States, appointed to

investigate soya bean production in the United States, in relation to the large scale utilization of the crop as a possible source of vegetable oil in Australia. The report refers to all aspects of the soya bean industry, including the botanical and agricultural characteristics of the plant, its environmental requirements, and improvement of the crop by breeding. The various recommendations of the mission are presented. Of particular interest to plant breeders is the intensive programme of breeding and testing of the soya bean and other vegetable oil producing crops in Australia recommended in the report.

1298. CARTER, J. L. 635.655–2–1.521.6:575(73)
Research on soybeans.
Soybean Digest 1947 : **7** : No. 10 : 12–14, 17.

The work of breeding and testing new soya bean varieties at the U.S. Regional Soybean Laboratory is described. The performance of Ogden and Roanoke in the tests is referred to, and the characteristics of a promising selection from a Haberlandt x Ogden cross are indicated. Strains from several other crosses are to be included in a nursery to be started in 1947. Promising strains for the south-eastern part of the United States have also been obtained by hybridization, and varieties developed by other experiment stations have been tested and released to the North Central States. Capital, a variety developed at Ottawa, Ontario, and tested widely from Oregon to New York has proved to be of high yield and oil content; it should be valuable in the northern tier of states. A Mukden x Richland selection should be useful in Minnesota, Wisconsin, Michigan and northern Indiana, and another selection from the same cross which will probably be released soon may replace Richland as well as some of the Lincoln acreage where earliness is desired. Probably the most outstanding variety so far produced is Lincoln, from a natural cross between Mandarin and Manchu. Its yield and oil content are high but it is not resistant to lodging. By crossing it with Richland, however, and back-crossing the hybrid to it, progeny have been obtained which show promise of combining earliness and resistance to lodging with high yield and oil content. A Dunfield x Illini selection has given an average oil content exceeding that of either parent. A number of improved strains of group IV maturity have been developed in co-operation with the Indiana Station. Superior varieties have been crossed with C.N.S., a southern variety resistant to bacterial pustule in order to introduce the factor for resistance into these strains, and some of the progeny have shown sharp segregation for pustule resistance. Crosses have also been made for the purpose of developing improved mildew-resistant strains. A search is being made for strains resistant to the various soya bean diseases, and as they are found they will be crossed with better agronomic types.

1299. ANDERSON, M. E. 635.656:575(73)
New pea variety : Rogers Improved Profusion.
Canning Tr. 1945 : **67** : p. 12.

The new pea was developed from a cross between Profusion and M x F, a large podded hybrid used for breeding purposes only. The new variety has a shorter haulm than Profusion or Prince of Wales and is slightly earlier in season (74 days to the canning stage). Its yield over a trial period of three years has exceeded that of Profusion. The pods are four inches long, light green, semi-blunt and well filled. The fresh peas are of the Profusion type, uniform and equal in quality and size, and the seeds are large, cream and wrinkled.

1300. 635.656:575"793"
LAMPRECHT, H. 635.656:581.149:575.182
Studien über die Zeitigkeit bei *Pisum* I. Die Begriffe Zeitigkeit und Lebensdauer. (**Studies on the earliness of *Pisum* I. The conceptions earliness and duration of life**).
Agri Hortique Genetica, Landskrona 1947 : **4** : 105–18.

A comparison of approximately 30 varieties of pea has shown that flowering date is not correlated with length of life. Both flowering time and the date of development of the first green pod are determined by genes. Duration of life, however, appears to be determined by progenes (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1160).

1301. 635.656:575.116.1
LAMPRECHT, H. 635.656:576.356.2
Die Koppelungsgruppe *Uni–M–Mp–F–St–B–Gl* von *Pisum*. (**The linkage group *Uni–M–Mp–F–St–B–Gl* of *Pisum***).
Agri Hortique Genetica, Landskrona 1946 : **4** : 15–42.
An extensive series of pea crosses has cast doubt on many of the linkage relationships posited earlier. The seven genes *Uni–M–Mp–F–St–B–Gl* are linked in that order. An interchange has been discovered between the chromosome bearing the seven genes already mentioned and the chromosome bearing *Gp–Cp–Fs–Ast*.
Certain cases of semi-sterility in *Pisum* are attributed to crossing-over between one or two small homologous segments of chromosomes otherwise heterologous.

1302. ŠAKUROV, V. Z. 635.656:575.12:578.08
(**Something new in crossing peas**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 71–72.
On keeping pollen grains at high humidity at a temperature of 20 25° C. they germinated within 10-15 minutes. It was found that the ovules were ready for fertilization some time before the anthers burst and by pollinating at that time it was possible to effect hybridization without emasculation. When a green seeded variety was pollinated with a yellow seeded variety in the flower bud stage, whilst the anthers were still immature, 20 green to 160 yellow were obtained; pollinating at the stage when the flower was about to open, and the anthers were ripe but not burst gave 45 green and 285 yellow seeds, while pollinating when the anthers had burst gave 177 green and 43 yellow seeds. Pollinating after emasculation gave 24 green: 140 yellow.
A special device for rapidly pollinating pea flowers is described, consisting of a curved V shaped paint brush, one end of which opens the flower while the other end, bearing the brush, effects the pollination.

1303. ANDERSON, M. E. and 635.656:591.6
MOLL, A. C. 635.67.00.14(73)
Some new developments in canners' seeds. Performance and characteristics of new varieties of peas explained.
Canning Tr. 1946 : **68** : 26, 28, 52.
Reference is made to various recently developed varieties of canning peas. A hardier strain of Wisconsin Early Sweet has been produced by pure line selection. The recent improved varieties of the late sweet class, viz., Pride, Wisconsin Merit, Bonneville, Resistant Famous and Rogers Earliest Perfection, are all with the exception of Wisconsin Merit, somewhat earlier than Wisconsin Perfection, and all are resistant to common *Fusarium* wilt.
Recent varieties of the Prince of Wales or Profusion class with more determinate growth and better filled pods are Ranger (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 1047), Perfected Wales and Rogers Improved Profusion (cf. Abst. 1299).
New peas for freezing are being introduced, and the original freezing varieties have been improved in vigour, productivity and disease resistance.
The Delwiche Commando is described (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1463). It resembles Perfection in haulm height, in type and shape of pod and in size of pea. When canned, the Commando is of good quality, colour and flavour. It has been crossed with other early and late varieties.
M–L 33, a cross between an Alaska and a Sweet variety, has smooth seeds and is, when canned, more tender than any Alaska. In haulm height it resembles a good grade but has a slightly thicker stem, matures about two days later and exceeds Alaska in yield. Its early growth is very vigorous. It bears seven to nine peas per pod.
The results of trials of sweet corn at Phio are reported.
Details are given of the new tomato variety, Sioux, already described in *Plant Breeding Abstracts*, Vol. XVI, Abst. 1599).

1304. FIRSOVA, M. K. 635.656:581.6(47)
(Rate of cooking of seeds in recommended varieties of peas).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 58–62.

Rate of cooking is estimated as the time from placing the peas in boiling water to the moment when the seed coat bursts. When the peas in a sample burst at different times the cooking coefficient is calculated according to the formula $K = \frac{s}{t}$, where s = the number of peas in the sample and t = the average time to bursting. Varieties with coefficients of 7·5 and over are classed in group I, the best variety of all being Kapital, with a coefficient of over 8, and in certain zones up to 12. The next variety is Masličnyĭ [Oily], followed closely by Thursday and Grad Amurskiĭ. All varieties with values between 7·1 and 7·5 are classed in group II, which contains the various Victoria peas. The third group has coefficients below 7, and the lowest value was given by the variety Irlandec [Irishman], with a coefficient of 6·9.

1305. TAPLEY, W. T. 635.656:581.6(74.7)
New varieties of peas for canning and freezing.
Canner 1947 : **105** : No. 19 : 14–16.

In tests of canning and freezing pea varieties at the Experiment Station, Geneva, New York, in the 1947 season, the varieties Commando, Surpass and Bonneville have shown promise as canning peas, and the varieties Cody, Wyola, Freezonian, Victory Freezer and Dark Green Perfection as peas for freezing.

1306. GARBUZOVA, D. A. 635.656-2.482–1.521.6
(Breeding of peas for resistance to *Ascochyta*).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 30–31.

The method used in testing for reaction to *Ascochyta* is described. Two varieties, 36/4 and Falenskiĭ 1, were distinctly more resistant than the standard Kapital, and gave 12–14% more yield. Other varieties classed as practically immune have been produced and are under observation.

1307. MALJUTA, D. I. 635.656–2.482–1.521.6
(New varieties of peas at the Ramonj Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : **13** : Nos 9–10 : 69–71.

The hybrid Ramonj 77 has exceeded the standard Mahndorf Victoria by 2·2 c. per ha. in yield and is resistant to *Ascochyta*. Some of the new hybrids have given even higher yields.

1308. 635.656.00.14(47.1)
HIRVENSALO, U. E. 633.16.00.14(47.1)
Försöksresultat från Mosskulturföreningens försöksstationer för år 1945.
(Results of experiments from the Experimental Stations of the Association for Bogland Cultivation, 1945).
Finska MosskFören. Årsb. 1946 : **50** : 24–27.

Among the work done at the Leteensuo Experimental Station were trials of the Ilo and Artturi peas. Ilo proved a productive type which held its own in competition with fodder peas: it should be useful both for culinary and fodder purposes.
At the Karelian Station trials of Finnish, Swedish and other varieties of barley, peas, potatoes and carrots on different soils were conducted. Results are shown in tabulated form in the subsequent Finnish section of the report which is provided with bi-lingual headings in the tables for the assistance of Scandinavian and other readers.

1309. MEHTA, P. R. and
MUNDKUR, B. B. 635.657–2.452–1.521.6(54)
Some observations on the rust of gram (*Cicer arietinum* L.).
Indian J. Agric. Sci. 1946 : **16** : 186–92.

A study of the resistance of different varieties of *C. arietinum* to *Uromyces Ciceris-arietini* (Grognon) Jacz. is reported.

1310. MANGELSDORF, P. C. 635.67:581.483:575.113.3
The inheritance of amylaceous sugary endosperm and its derivatives in maize.
Genetics 1947 : **32** : 448–58.

A new type of endosperm is reported in maize segregates which have been shown to have the genetic composition *su*^{am} *su*^{am} *du du*. In the homozygous condition *du* produces a dull appearance in the seeds.

The various genotypes obtained from crossing are described. They include two new true breeding genotypes, supersugary, *su du* and pseudostarchy, *su*^{am} *Du* as well as others which throw light on the action and interaction of the genes involved, the genetical composition of different sweet corn varieties tested and the way to improve varieties and inbreds as regards their water-soluble polysaçcharide content. It is suggested that sweet corn inbreds could probably be tested for modifier complexes which affect quality by crossing them with amylaceous sugary.

1311. 635.67.00.14(76.4)
635.67–2.7–1.521.6(76.4)
PICKETT, B. S. 635.67:575.12(76.4)
Sweet corn tests in the Lower Rio Grande Valley.
Bull. Tex. Agric. Exp. Sta. 1947 : No. 689 : Pp. 13.

The results are summarized of tests of sweet corn varieties and hybrids conducted by the Texas Agricultural Experiment Station in the Lower Rio Grande Valley during the period 1944–46. Notes are given on the following hybrids, which are considered as promising: Ioana, Golden Hybrid 2439, Erie (Bantam Hybrid 51), Bantam Hybrid 57, Silvercross Evergreen and Stowell's Evergreen Hybrid 14 x 15.

Tests of resistance to earworm are also reported. Bantam Hybrid 57, Golden Hybrid 54, Magnagold and Silvercross Evergreen were the most resistant hybrids. Ioana and Erie showed a satisfactory degree of resistance, although they were not graded among the most resistant hybrids.

1312. COSTA, A. J. DE C. FERNANDES 635.71:581.6:582(46.9)
Subsídios para o estudo das plantas aromáticas Portuguesas. (**Contributions toward the study of the aromatic plants of Portugal**).
Coimbra 1945 : Pp. 166.

Chemical analyses have been made of the essential oils of the *Thymus* species of Portugal. In general, a correlation was found to exist between classifications of the species based on morphological and biochemical characters respectively.

BOOK REVIEWS

030.8:57(46)
GOLDBERG, M. 030.8:54(46)
English-Spanish Chemical and Medical Dictionary.
McGraw-Hill Book Company, Inc., N.Y. and London. 1947: 50s.
Pp. ix + 692.

The chief translator of a translation bureau in New York has produced this English-Spanish, chemical and medical dictionary which, it is claimed, contains over 40,000 technical terms relating to medicine, surgery, dentistry, pharmacy, veterinary science, biochemistry, biology and allied sciences, including over 2000 words relating to scientific equipment.

The field covered by a technical translator working in a commercial bureau is usually very wide and one cannot therefore expect that all the above-mentioned branches of science should be comprehensively and systematically treated. In this dictionary the stress appears to be on the medical and allied sciences.

The biological terms include some cytological and genetical words.

The value of the dictionary for Spaniards—translators or students—acquainted with the American idiom and reading English or American texts will be increased by the fact that, in addition to the exact equivalents, definitions are given in Spanish of a very large number of medical, veterinary and other words.

Allowing for the post-war shortages, the book is well produced and the system of larger and heavier type for main words, is to be commended, and the price fifty shillings, though probably beyond the means of individual translators in this country, does not appear an excessive recompense for the considerable work of compilation.

GARDNER, W. 030.8:581.6
Chemical synonyms and trade names. A dictionary and commercial handbook.
Technical Press Ltd., Surrey 1948: 5th Ed.: 50s.: Pp. 558.

The number of trade names for materials used in industry is constantly on the increase, and the development of plastic substances in recent years has in particular augmented the vocabulary of the industrial chemist. The fifth edition of this dictionary of chemical synonyms and trade terms has been revised and enlarged to include a large number of plastics, synthetic resins, plasticizers and other new products. It contains 28,000 definitions and cross references, intended for the use of the chemist, manufacturer and dealer. The dictionary makes some attempt to cover plant products, but their inclusion appears to be guided by somewhat arbitrary choice; for instance, if the fibres Chinese jute, Gambo hemp, roselle, Mauritius hemp, abacá, ramie and kapok are included, it seems surprising not to find also cotine (fibre from *Asclepias syriaca*), New Zealand hemp, sunn hemp or esparto. In addition, the information on plant products shows signs of a lack of acquaintance with modern taxonomical nomenclature; nor can it be said to be free from misprints, e.g., *Maranta* and *Capsicum annuum* are incorrectly spelt. The dictionary is well produced, its clear type making it easy and pleasurable to consult, and in spite of faults which strike a reviewer chiefly interested in plant products, the dictionary admirably serves its main purposes of a much needed book of reference for the industrial chemist.

TWENEY, C. F. and
HUGHES, L. E. C. (Editors). 5:030.8
Chambers's technical dictionary. Comprising terms used in pure and applied science: medicine: the chief manufacturing industries: engineering: construction: the medicine trades. With definitions by recognised authorities.
W. and E. Chambers Ltd., London and Edinburgh 1947: 21s.
Pp. vi + 975: figs.: tables.

Everyone who has used the earlier edition of this admirable dictionary of technical terms already reviewed in *Plant Breeding Abstracts*, Vol. XI, p. 62, will welcome the revised

edition. Its publication is particularly opportune at the present time when specialization in technical knowledge and applied science occupies such a prominent place in the instruction and training of candidates for posts in industry, trades and various branches of applied science.

The dictionary is unique in the range of subjects covered; over 120 are cited in the introductory list of abbreviations and very few overlap.

The work is intended for the specialist, technician and layman and the definitions are clear and adequate, as far as a single reviewer can claim to judge such an encyclopaedic collection of technical terms.

From long experience in the use of technical dictionaries of many kinds, the reviewer can once again recommend this book as a unique and highly useful work of reference, which technical institutes, libraries and other educational bodies concerned with applied science should not be deterred from buying by the increased price.

Authors and publishers once again deserve the favourable judgments passed upon the earlier edition by the technical press, ranging from the *Journal of the Institute of Metals*, *British Medical Journal*, and the *Transactions of the Faraday Society*, to *Silk and Rayon* and five periodicals dealing with different specialist branches of engineering.

DAVIES, O. L. 519.24

Statistical methods in research and production.

Oliver and Boyd, London 1947: 28s.: Pp. xi + 292: figs.: tables.

In this book a group of chemists, engineers and statisticians, employed by Imperial Chemical Industries Ltd. on problems of industrial research, have co-operated to produce a handbook of statistical methods in order to make available to a wider field of workers the special knowledge and information accumulated as a result of the Company's manufacturing and industrial experience. In the past, statistical methods of general application have often been developed and illustrated with reference to a particular field of research with the result that their importance has been missed by workers in other fields. This is especially liable to occur with books written largely from the practical angle—describing methods and techniques while omitting the theory. For this reason a book is most welcome which sets out to show how standard statistical methods can easily be adapted to deal with the research and production problems of industry, in this case particularly the chemical industry. In his preface, Lord McGowan hopes that the series of scientific and technical handbooks to be published by I.C.I., of which the present volume is the first, will contribute towards helping British industry maintain its place against world competition.

An introductory chapter deals with the scope of statistical methods. It is followed by chapters on: frequency distributions; averages and measures of dispersion; tests of significance; the analysis of variance; regression and correlation; frequency data and contingency tables; sampling; control charts; and, finally, prediction and specification. There are numerous worked examples, a useful glossary of statistical terms, and several tables. The book is concerned primarily with actual methods and much of the algebraic material included is set out in appendices at the end of the appropriate chapters.

While elaborate theoretical considerations would certainly be out of place in a book of this type it is important that false ideas should not be allowed to establish themselves in the mind of the experimenter by the unqualified assertion of general theorems which are not in fact universally valid. For instance, on page 25 we have: "The arithmetic mean as defined in equation (3.1) is the arithmetic mean of a sample of N, but if these N observations constitute all the information available, $\bar{x}$ is also the best estimate of μ, the Universe mean, assuming the sample is a random one. As N increases, $\bar{x}$ becomes a more and more precise estimate of μ." And on page 35 we find: "A further result of importance in connection with the sampling distribution of the mean is that, whatever the nature of the parent Universe, the distribution of sample means tends rapidly to the Normal form as the sample size increases". Although the three statements in these two passages are often true in practice, it would be dangerous to assume that this is always so, and in the case of the Cauchy distribution, for instance, all three are false.

The treatment of significance tests is by no means lucid. For example, section (*b*) at the

bottom of page 52 describes, quite correctly, how one calculates the probability that a statistic will have the observed or more extreme values. But in the following paragraph (*c*) the true logical situation is confused:—

"Appropriate statistics are calculated from the data and the results compared with the values given in the tables, so that the probability that these results could have arisen, if the Null Hypothesis were true, is known. . . . If the probability is low, it is concluded that either:

(i) An improbable event has occurred, or

(ii) The Null Hypothesis is false.

It is logical to choose a probable rather than an improbable explanation, so that (ii) is taken to be true, if the probability is low enough".

It is important to realize that, as correctly stated in (*b*), we calculate the probability that the statistic will have the observed *or more extreme values*, and not merely the observed value. With reference to (i) it may be noted that, with continuous variables at any rate, any event is extremely improbable (if we ignore the fact that there is a limit to the accuracy of measurement any event would be infinitely improbable). A rigorous justification of the commoner tests of significance is by no means simple, but a more accurate indication of the issues involved might be briefly summed up as follows:

The object of a significance test is twofold: to avoid

(*a*) Rejecting the null hypothesis when it is true,

(*b*) Accepting the null hypothesis when it is false.

We can control errors of the type (*a*) by choosing the level of significance. At 5% we expect in the long run to reject a true null hypothesis once in 20 times. To ensure this, however, rejection over any range of the statistic used corresponding to 5% of the area under its frequency curve would do. If we further try to reduce as far as possible the occurrence of errors of the type (*b*), it can be shown that many of the tests used in common problems, such as Student's t and Fisher's z (which involve rejection regions occupying the tails of the curve—one or both as appropriate), are actually the best to employ. With this kind of approach we can justify theoretically the technique of calculating the probability that the statistic has the observed or more extreme values.

A serious omission is the failure to provide an adequate discussion of the problem of estimation. Indeed the efficiency of estimation is referred to only in the glossary, and the method of maximum likelihood is not mentioned at all. It is most important, in all fields of research, for the practical statistician not only to be familiar with methods of estimation but to realize that the use of "inefficient" methods can be positively misleading. It is to be hoped that subsequent editions will make good this deficiency. N. T. J. B.

Love, H. H. 519.24:631.421

Experimental methods in agricultural research.

Agric. Exp. Sta. Univ. Puerto Rico: Río Piedras, Puerto Rico 1943: $2: Pp. v + 229: 84 tables.

If full advantage is to be taken of modern methods of conducting agricultural trials in which several factors, e.g. varieties, treatments, block differences etc., are examined simultaneously, a certain amount of thought and care in designing the experiments and a modicum of arithmetical computation is unavoidable. It is sometimes thought that such devices as the analysis of variance or covariance, Latin squares, randomization etc., are high falutin' methods only to be used and understood by mathematicians, who just like that kind of thing, and that in any case it is rather like cracking a nut with a sledge hammer. Neither of these ideas is true.

So far as the first is concerned, the correct use of many statistical methods does not require an understanding of the underlying mathematical theory, and any intelligent agricultural research worker should, after a study of the methods available and some practical experience in their application, be quite capable of designing ordinary experiments and of using the correct statistical interpretation. Unusual or doubtful cases can be referred to a statistician. As for the second, it cannot be too strongly emphasized that the employment

of statistical technique can make an enormous difference in efficiency; funds available for research are always limited and it is important to try to design experiments so as to yield conclusive results with as little outlay as possible, and to avoid squandering resources on massive but indecisive layouts. Further, the use of factorial designs can make available more information than could be obtained merely by considering the variation of only one factor at a time. It is also important to arrive at conclusions warranted by the data; inefficient methods of interpretation may not only be inconclusive, they may be positively misleading. Finally, it should be mentioned that in working out the results, the actual computations usually involve no more than an acquaintance with elementary arithmetic, a little practice in the use of tables and an easily acquired facility in the use of a calculating machine.

In the first chapter of his book Dr Love discusses the basic idea of measuring variability and introduces in a simple manner means, standard errors, frequency distributions, and the *t* test. In the second chapter the analysis of variance is dealt with, leading on to the analysis of correlation and covariance in the following chapter. Abstruse discussions are avoided, the emphasis being all the time on actual applications. A wealth of worked examples are provided and show, in a very practical way, just how one handles raw numerical data. The fourth chapter develops the treatment and deals with several refinements and variations, introducing various new topics such as interactions, split-plot designs, confounding and the use of transformations. The latter are often valuable in making amenable to the standard analysis of variance, treatment data which would not be so otherwise. The final chapter, "General suggestions for the conduct of experiments", is a most valuable general discussion of several important subjects connected with the carrying out of agricultural field trials, the experimental field, the size and shape of plots, border effect, sampling for yield, and so on. On the whole this is a most useful little book and well worth study by agricultural research workers who have only an elementary knowledge of mathematics.

There are a few misprints and omissions. On page 37, line 10 should obviously run: "p = the sum of the yields of all the plots of the same variety *in which the missing plot occurs*". On page 64, line 11 from the bottom should start: "*With* 1 *and* 35 *degrees of freedom*. . . ." N. T. J. B.

CRANE, M. B. and
LAWRENCE, W. J. C. 575.1
The genetics of garden plants.
Macmillan and Co., Ltd., London: 1947: 3rd Ed.: 16s.: Pp. xvii + 299: 44 tables: 67 figs.

The first edition of this book was reviewed in *Plant Breeding Abstracts*, Vol. V, p. 270 and the second in Vol. IX, p. 253. The work is by now so well known that it is only necessary to welcome the third edition and mention the main changes made. Xenia, which formerly was dealt with as part of chapter IX, now has a chapter to itself; some useful practical hints on the use of colchicine and other methods of inducing polyploidy are given in chapter XII; the function of heterochromatin in secondary association of bivalents is mentioned in chapter III and there are other minor revisions and additions, reflected in the bibliography in the form of new references. It is a great pleasure to draw attention to one small addition, that of the letters F.R.S. after Mr Crane's name on the title page. J. L. F.

MULLER, H. J.,
LITTLE, C. C. and
SNYDER, L. H. 575.1
Genetics, medicine, and man.
Cornell University Press, Ithaca, New York 1947: $2.25: Pp. viii + 158: 8 tables: 29 figs.

The six chapters of this book were originally the Messenger Lectures, delivered at Cornell University in 1945, these being an annual course "on the evolution of civilization, for the special purpose of raising the moral standard of our political, business, and social life".

The first two lectures, by H. J. Muller, deal with genetic fundamentals, under the headings "the work of the genes" and "the dance of the genes". They form a wonderfully concise, elegant and, for their length, surprisingly thorough introduction to genetics. The next two, by C. C. Little, are concerned respectively with "parental influence" and "growth and individuality", mainly illustrated by reference to mammalian genetics. The last two, by L. H. Snyder, are entitled "human genetics" and "the mutant gene in man". Though obviously intended for a rather wide audience, the book is by no means a light popularization, but one requiring, and deserving, serious study. It is amply documented and indexed and the text is amplified by plates, figures, tables, etc.

The moral and political aspects of the subject are rather kept in the background. Muller, indeed, confines himself very strictly to genetics and evolution and Snyder is content merely to give examples showing how a genetical approach can be helpful in medical practice. Little, however, makes one or two *ex cathedra* statements, such as "the blind and impractical worship of euphonious but sterile dicta of unscientific leaders, who have mistaken 'declarations' of human equality for truth, have too long held us spellbound". The "declarations" referred to presumably include that one which held it to be self evident "that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are Life, Liberty and the pursuit of Happiness". The euphony of this is, of course, a matter of opinion, but considering the important part played by the Declaration of Independence in the origin of the United States, it is surely an exaggeration to impute sterility to it. The fundamental error seems to be the confusion between political equality, which is a matter of man-made political rights, and biological equality which is partly a matter of genetics. J. L. F.

DEWAR, D. and
SHELTON, H. S. 576.12:576.11

Is evolution proved?

Hollis and Carter, London 1947: 18s.: Pp. 346: 2 charts: 8 tables.

It is curious how often a controversy ostensibly on one topic actually hinges on another. Mr Shelton and Mr Dewar, protagonist and opponent respectively of the theory of evolution, illustrate this point in their book *Is Evolution Proved?* since, although they set out to debate a question of fact, the truth or falsehood of evolution, their controversy really turns on a different and more subtle topic, the epistemological question as to the nature of scientific inference.

Regarding the facts, the authors are generally speaking in agreement. They differ in the inferences drawn from the facts and on the principles that can be validly employed in scientific induction. A rather faint appreciation of this situation appears occasionally in the text, but is only mentioned in passing and is not amplified.

The argument follows along well worn tracks that will be familiar to most biologists. Most of the relevant issues are broached, but on both sides the debate is prejudiced by the failure of the parties to maintain their discussion on a serene, objective and impersonal level. Mr Shelton cannot avoid the patronizing air of a man supporting a majority view, and his affectation of bewilderment at his opponent's remarks is overdone; Mr Dewar, on the other hand, suffers from a persecution complex, and unfairly requires his adversary to construct hypothetical explanations of matters on which evidence is lacking.

Mr Shelton marshals the usual evidence in favour of evolution, but he weakens his case by belittling the palaeontological data, which after all constitute the bulk of direct evidence. His attempt to account for the lack of intermediate forms by falling back on the fragmentary nature of the geological record is unsatisfactory; a far more adequate treatment of this problem has been presented in Dr Simpson's book *Tempo and Mode in Evolution*, where the concept of quantum evolution is developed along neo-Darwinian lines.

The principal reasons why Mr Dewar rejects evolution derive from (1) the gaps in the geological record, (2) the difficulty of imagining intermediate stages in the evolution of complex organs, or in the formation of instincts, (3) the shortness of the time scale, and (4) the failure of geneticists and breeders to demonstrate evolutionary development at the present day. As to the first objection, the existence of gaps does not necessarily

imply special creation; a particularly rapid evolutionary tempo may instead characterize the initial stages of new orders as Dr Simpson has suggested. The difficulty of imagining intermediate stages merely reflects on the ingenuity of biologists, while the difficulties raised by the time scale vanish if the incorrect assumption of a comparatively uniform evolutionary rate is discarded. The alleged failure of geneticists to demonstrate large mutations in present day organisms can hardly be maintained in the light of the work of Stubbe and Wettstein and others on macromutations in plants.

Mr Dewar's method of argument is to begin with some fact for which his opponent is unable to devise a satisfactory explanation, and then to put forward special creation as an alternative. This method of procedure is unreasonable. As already pointed out, inability to devise plausible explanations possibly demonstrates a lack of human ingenuity; it proves nothing as to the question of fact. Further, the concept of special creation has properties which seem to rule it out altogether as a legitimate scientific notion. The connotation of creation is clear; it means the bringing into and maintaining in existence of contingent being. If the universe is contingent, its creation must necessarily continue during every moment of its duration. The notion of creation as a mere initiatory act is clearly nonsense and derived from a literal interpretation of Genesis; the philosophical absurdity of this interpretation was recognized very early, and it was suggested by Procopius of Gaza, for example, that the Genesis account of creation was only cast in narrative from an account of the *ruditas judaeorum*. Scientific investigation of the universe reveals the regularities that are commonly called scientific laws. It therefore follows, if the creation of the universe is admitted, that creative activity is itself characterized by a high degree of regularity. Now special creation asserts that this regularity is interrupted at comparatively frequent intervals, in particular whenever a new family of organisms arises. This statement however is incapable of any sort of verification and certainly does not follow from our difficulty in reconstructing alternative hypotheses. A statement incapable of verification, is, as the logical positivists assure us, of little scientific value. While it would be foolish to maintain that special creation is impossible *a priori*, it would be equally foolish to claim that it has actually occurred in any of the cases so far suggested. On the other hand, the illegitimacy of asserting the occurrence of special creation does not thereby justify accepting evolution as demonstrably proved. It is obviously just as impossible to prove that every stage of the evolutionary process has occurred without any modification in the operation of natural laws as to prove the converse. In fact, the whole controversy turns on an hypothesis incapable of strict verification, and this explains why the two protagonists fail to resolve their differences. In such circumstances, the only legitimate conclusion that can be made is that some evolutionary changes have been observed experimentally and can be inferred from the geological record, and no reason has been discovered yet why the whole of the evolutionary process should not be explained solely in terms of the uniform operation of natural laws. The assumption that special creation has occurred cannot be inferred from the data, and could only be sustained were it a matter on which direct evidence were available.

A final point is the question of the causes of evolution, which Mr Dewar, and Mr Lunn, the editor of the book, appear to suppose would be settled more easily were special creation true. This supposition is erroneous, as Mr Shelton maintains, though not as forcefully as he could. The problem of evolution is a problem of fact and should be settled by a consideration of evidence. The problem of its cause, though highly interesting, is a different problem, and should be sharply distinguished from the question of fact.

The printing of the book leaves something to be desired.

EMERSON, F. W. 58

Basic botany.

The Blakiston Company, Pa. 1947: $4.00: Pp. xi + 372: 327 illus.

It must have been the experience of many botany students that, in the early stages of their studies, the various branches of the subject appeared rather disconnected. *Basic Botany* differs from the average botany text book in that the author constantly points out and stresses the underlying unity of the different aspects of botany with which he deals. Presented in this way, the subject is not only easier to understand and to learn but is also

very much more interesting. The frequent references to points made in previous chapters serve both to integrate the information and to afford useful revision, and the outlines which are given at the beginnings of chapters and the summaries at the ends are a further help in this connexion. Chapter 9 on "The Plant as a Unit" synthesizes the subject matter of the foregoing chapters on plant morphology, anatomy and physiology and applies it to the individual plant.

The author's experience in dealing with students is evidenced by his lucid explanations, special attention to difficult points and warnings against common mistakes. Interest is sustained by frequent references to practical applications of botanical knowledge. Numerous photographs are included and, with few exceptions, the diagrams are very good.

Chapter 10 is an excellent introduction to the fundamentals of genetics, and the following chapter an equally lucid exposition of the concept of evolution. The section on systematic botany is preceded by an account of the aims and objects of classification and an explanation of the binomial system of nomenclature. The last two chapters are devoted to ecology. Instructions for practical work are not included.

The book can be thoroughly recommended as a useful and interesting introduction to botany. It should prove valuable to first year university students in this country as well as in America although, for the former, it has the disadvantage that some of the examples of plants and plant communities are unfamiliar.

NEILSON-JONES, W. 581

The growing plant.

Faber and Faber Ltd., London 1948: 16s.: Pp. 206: 36 figs.: 9 plates.

A book dealing with a specialist subject, or with several such, and which is intended for the general reader must, if it is to serve its purpose, be written with clarity, avoiding technicalities as far as possible, and while omitting a large body of detail the essential features must be stressed without over-simplification of the subject.

Professor Neilson-Jones's new book sets out to provide just such a source of information on a variety of botanical topics, most of which are very insufficiently dealt with in text books generally. Technical terms, where employed, are explained and the glossary at the end of the book will be a great asset to the non-botanical reader. In each of the topics considered the author has shown great skill in selection of his material from the immense amount of available data, but by means of well placed cautions prevents the reader from jumping to untenable conclusions based on over-simplification. In this respect chapters 2 and 3, on Plant Chimaeras and Growth Hormones respectively, are the most successful. In Chapter 7 on Reproductive Problems the balance between what is chosen for inclusion and what is omitted is rather less fortunate, and a highly complex subject is somewhat inadequately dealt with. Many readers, for instance, might be interested to know more of how chromosome maps are prepared than the bare fact of their existence, and the description of meiosis without a fuller discussion of linkage is hardly satisfactory.

Two chapters on Plant Nutrition are included and these survey the field in a thorough manner. The first deals with the essential elements of plant growth and with the interesting topic of trace elements, and gives an account of the newly developed technique of hydroponics. The following chapter on Plant Growth in Soil lays great stress on the complexity of the biological properties of the soil, and certainly forces a realization of the importance of humus to the growing plant, but does so in a somewhat clumsy manner by a rather artificial contrast of growth in sand or water culture with that in the soil. In view of the length at which this subject is dealt with, it is rather surprising to find no mention of the mechanism whereby water or nutrients enter the plant.

It would be impossible to include in such a book all the topics of interest to every reader, but within the modest compass of 200 pages, for the most part eminently readable, this volume has achieved a great deal in that direction. The general interest is heightened by the way in which practical aspects of the problems dealt with are introduced wherever relevant.

Although intended mainly for the general reader this book will prove invaluable to university students, embodying as it does a great deal of modern research on subjects which are,

unfortunately, but rarely discussed except in original papers. To these there is a comprehensive but not overwhelming bibliography at the end of each chapter. R. H. R.

ELLIS, C. and
SWANEY, M. W. 581.09
Soilless growth of plants.
Reinhold Publishing Corporation, N.Y. 1947: 2nd Ed.: $4.75: Pp. x + 277: figs.: tables.

The cultivation of plants in artificial media has two chief applications: it is useful in areas where climatic conditions favour crop production but the soil is unsuitable, and it has certain advantages over soil culture as a technique for forcing plants in greenhouses. Since the publication of the first edition of this book in 1938, this method of culture has been practised on a much wider scale than previously, and thus the second edition contains much information which was not then available, and its scope has been considerably extended. In revising the text, the authors have kept in mind three classes of readers, the professional grower, the hobbyist and the agricultural or horticultural student, all of whom should find in it a useful guide to the principles and practice of soilless culture.

The book begins with a very brief and necessarily rather over-simplified introduction to plant structure, function and physiology. The mineral nutrition of the plant is, of course, described in some detail. Three types of soilless culture are dealt with, water culture, sand culture and gravel culture. Most attention is devoted to the last of these as it seems to offer the greatest commercial possibilities. The section dealing with the determination of nutrient ion concentrations is particularly valuable.

A useful list of references to relevant literature is included.

GARNER, R. J. 581.165.71
The grafter's handbook.
Faber and Faber Ltd., London 1946: 15s.: Pp. 223: 95 figs.: 24 plates.

Mr Garner's new book of grafting methods has all the marks of a future standard work. Its great value lies in the full details given of the practical aspects of grafting and their application in commercial practice, especially from the pomological standpoint. The grafting of herbaceous material and the application of grafting to research are by no means ignored and anybody who has to do any grafting of plants at all is sure to find useful information here. The physiological and anatomical background is sketched in very lightly. Everything about the actual work of grafting is very fully and clearly described and lucidly illustrated by line drawings. A glossary, references and an index are provided and there are 24 half tone plates. J. L. F.

GOOD, R. 581.9
The geography of flowering plants.
Longmans, Green and Co., London 1947: 30s.: Pp. 403: 71 figs.: 25 plates.

This book was ready for the press in 1939, and it therefore mainly depicts, as the author states in the preface, our state of knowledge in the subject of plant geography up to that time.

It deals extremely well with the facts and theories of plant distribution, though more summarily, as the author himself admits, with the evolutionary background. Methods of speciation are inadequately and even misleadingly dealt with, while polyploidy is barely mentioned.

Detailed lists of families, genera and species illustrate the different types of distribution from cosmopolitan to endemic and from continuous to the various types of discontinuous. An excellent series of maps with the distribution areas clearly marked forms a useful adjunct, and the photographic plates are well presented. While the main part of the book deals with distribution of plants on a world scale, two interesting chapters treat the distribution of the British flora and the distribution of plants in an English county. The author also includes a chapter on the distribution of fossil plants.

The second part of the book discusses the factors of distribution and examines the various theories to explain discontinuous distribution. As would be expected in a work of this kind, cultivated plants are hardly mentioned and the theories of centres of origin, which

have been applied chiefly to these, are consequently inadequately dealt with. The hypotheses advanced to account for the origin of cultivated plants are also hardly in accord with modern ideas on this subject.

These criticisms, however, are not meant to detract from the general high standard of the book when confined strictly to the subject with which the author is mainly concerned. He is surely to be congratulated on compressing such a large amount of information into some 400 pages and presenting it in such an attractive and readily accessible form.

J. G. H.

GUSTAFSON, A. F. 631(73)

Using and managing soils.

McGraw-Hill Book Company, Inc., London and New York 1948: 17s.: Pp. xi + 420: 190 figs.

This book on soils is designed to give present and prospective farmers, gardeners and agricultural students in the United States of America guidance in the use and management of soils and the fundamental facts of soil science. Its fifteen chapters deal comprehensively with the formation and properties of different soils, the proper selection of land for farming, control of erosion, fertilization, drainage, dry farming, irrigation, systems of crop rotation and other essential topics. The book is clearly and simply written, and excellently illustrated by 187 photographs.

HALL, M. (Editor). 633

Five hundred varieties of herbage and fodder plants.

Commonwealth Bureau of Pastures and Field Crops, Aberystwyth 1948: Bull. No. 39: 15s.: Pp. viii + 328.

The main part of this very useful catalogue of herbage and fodder varieties lists information received direct from official correspondents and specialists in Australia, Canada, Finland, Great Britain, India, Netherlands, New Zealand, Norway, Palestine, Sweden, South and East Africa and Trinidad. The publication contains no direct contributions from the U.S.S.R., United States of America and Denmark. It is hoped that it will be possible to render subsequent editions more complete as regards the countries covered, including the U.S.S.R. The introduction draws attention to the difficulties encountered in the compilation of such a catalogue as a result of the variations in standards of naming and certifying varieties in the different countries, frequent use of synonyms, and similar problems; and the object of the list has been the provision of as much information as could be possibly collected for a first edition in the circumstances, and at the same time to draw attention to general problems and the need for action concerning the recognition and naming of varieties, reduction in the number of synonyms and other matters.

The main part of the catalogue is arranged alphabetically according to genus and species; within species the information is arranged alphabetically according to country, and within countries alphabetically according to varietal name. No country headings are given, and the present reviewer is of the opinion that their addition would be an improvement in clarity. The notes on each variety deal with origin, authority, characteristics, adaptation, resistance to diseases and pests and adverse conditions, use, certification, grades recognized, authority for certification, and whether or not the particular variety is on the open market. The second part of the bulletin provides an index of varieties, arranged alphabetically under genera and species, and containing references to relevant summaries in Volumes 1 to 17 (1931-47) of *Herbage Abstracts*. This section contains references to varieties developed in the U.S.S.R., United States and other countries not included in the main part of the catalogue.

The publication will be of considerable interest and value to research and advisory workers and to the seed trade.

633.15(73)

Corn facts and figures. A reference book.

Corn Industries Research Foundation, New York 1947: 4th Ed.: Pp. 48: figs., tables and maps.

The value of the annual maize harvest in the United States of America far exceeds that of any other agricultural crop, and the production of hybrid maize, particularly in the

Corn Belt, is well known as one of the most important and spectacular achievements of plant breeding in recent years. This publication of the Corn Industries Foundation gives an interesting and concise account of the diverse part played by maize in American economy and everyday life, supported by statistical data on the production of the crop and its utilization. A comprehensive list is included of the products of maize and their uses. A useful bibliography lists publications of general interest.

BEAVEN, E. S. 633.16:575
Barley: 50 years of observations and experiment.
Duckworth and Co. Ltd., London 1947: 30s.: Pp. xx + 394: 49 figs.: 61 tables.

It is possibly its close connexion with our national beverage which makes English agriculturists regard the barley crop with a special affection. For many years now the barley variety situation in England has been dominated by two names, Plumage-Archer and Spratt-Archer, and the names of their respective breeders, Dr E. S. Beaven and Dr H. Hunter are regarded with corresponding respect, both at home and abroad. Plant breeders especially, and agriculturists generally, will therefore welcome the appearance of this, unfortunately posthumous, compilation of Dr Beaven's writings and reports on barley. The 32 chapters cover, in a rather rambling and sometimes repetitive fashion, all aspects of the crop and present a fascinating picture of the life work of a practical, self trained plant breeder who concentrated exclusively on this crop. Even the occasional errors of fact, of attribution and of botanical description, which have crept in contribute their part to the lively self-portrait of a very human figure, grappling year after year with the practical problem of the improvement of barley. Much food for thought is provided for plant breeders by the forcefully expressed and often somewhat unorthodox views of the author. There is not room here to discuss or even to summarize those views, but one example may be given as illustration, the sequence of selections all given the name Plumage-Archer. The original selection was carried in the breeding plots as X14/145, the cross being Plumage × Archer, made in 1905, and 145 being the number of the F_2 plant from which the successful selection derived; it was released in 1914 as "Plumage-Archer 1914". A single plant selection from this variety was distributed in 1924 as "Plumage-Archer 1924". From a cross between Plumage Archer 1924 and Biffen's 59/7 (a narrow-eared selection the origin of which is not stated) was derived Plumage-Archer 25/1, which was not distributed; crossed with Spratt-Archer 37/6 (Hunter's selection) it gave rise to Golden Archer and Plumage-Archer 1935, the latter being again based on a single F_2 plant. Plumage-Archer 1935, crossed by Spratt-Archer 37 No. 3 (the latter described as a selection by M. Caffrey) produced a selection X54/12/3, which according to the book was released in 1943 as "Beaven's 1943" but which is listed in seedsmen's catalogue as "Beaven's 1943 Plumage-Archer". While all these different Plumage-Archers are all of the same general type, *erectum* forms with a short neck and high malting quality, it is evident that by present day standards they would be better regarded as distinct varieties, especially if the importance of uniformity of maturing in malting barley has not been exaggerated. Their nominal distinction one from the other only by the addition of the year of release (which the author himself does not always trouble to give) is likely in practice to lead to mixing on the farm. The author's justification for his practice is found in his views on purity of a variety. He argues that since barley may vary in 20 characters there are at least 2^{20} possible combinations, from which he somehow concludes that there can be no such thing as a pure line of barley, and that the importance of purity of seed has been much exaggerated In this and in other cases, the more orthodox plant breeder will find himself disagreeing with the author, but this does not make the book any less stimulating to read. It will have a lasting place in agricultural literature, not merely as a source of information on barley, but as a chapter in the history of plant breeding. J. L. F.

THOMAS, J. O. and
DAVIES, L. J. 633.2/3(410 + 41.7)
Common British grasses and legumes.
Longmans, Green and Co., London 1946: 2nd Ed.: 9s.: Pp. 120: 50 figs.

Since the first edition appeared in 1938, this little book has become widely known and shown

itself suitable for the uses for which it was intended, that is for schools, agricultural colleges, young farmers' classes and for farmers. The main part of the book consists of concise botanical descriptions of some 27 grasses and 15 legumes, with burnet thrown in for good measure, each plant being skilfully illustrated by clear, line drawings. General accounts of grasses and legumes are given and also keys to the vegetative characters. A short list of references, a glossary and an index are provided. Some little confusion may arise from the failure to distinguish between rhizomes and stolons and it would have been better in figure 1 to illustrate a "seed" of Italian ryegrass with the typical, flattish rachilla rather than the exceptional, roundish rachilla shown. These, however, are very minor faults and the book is one to be recommended at the elementary level for which it is intended. J. L. F.

ROBINSON, D. H. 633.3(410 + 41.7)

Leguminous forage plants.

Edward Arnold and Co., London 1947: 2nd Ed.: 8s. 6d.: Pp. vii + 119: 35 figs.

The main object of Dr Robinson's little book, as stated in the preface, is to give the information required for the recognition of the more important leguminous crops grown on British farms. After giving the general characteristics of the leguminous forage crops, he deals with the *Trifolium* species (*T. pratense, T. hybridum, T. repens, T. dubium, T. subterraneum* and *T. fragiferum*), *Medicago sativa* and *M. lupulina, Lotus corniculatus* and *L. major, Anthyllis Vulneraria, Onobrychis viciaefolia, Lupinus albus, L. angustifolius* and *L. luteus, Melilotus officinalis, M. indica* and *M. alba, Vicia Faba* and *V. sativa, Pisum arvense* and *Soya Max*. In all cases the general characters of the plant and those of the seed and seedling are given, followed by information on uses and in most cases seed production and chemical composition. The text is illustrated by line diagrams and there are an appendix giving the usual seed statistics, a glossary and a short subject index. Very few references are given.

Since the first edition was published in 1937, the book has proved its value, especially for agricultural students, and can be confidently recommended as an elementary account, though the reviewer would disagree with a number of minor points connected with varieties and seed production. J. L. F.

633.73

Le café dans le monde. (**Coffee in the world**).

Institut International d'Agriculture, Bureau de la F.A.O., Rome 1947: No. 9: Pp. 607: tables: maps and graphs.

Various different aspects of coffee production are dealt with in this very comprehensive monograph, the major part of which is devoted to the presentation and discussion of available statistics concerning the production and trade of coffee in the world as a whole and in the different coffee-growing countries. The history of the introduction, cultivation and consumption of coffee in different regions is outlined. Another section is devoted to the systematics of the genus *Coffea* (descriptions of the principal species and varieties being included), habit, methods of cultivation and commercial preparation of coffee, data concerning its chemical composition, and the diseases and accidents to which the plants are subjected. The economics of coffee production forms the subject of another section in which the cost of production, the maintenance of equilibrium between supply and demand, etc. are discussed, and which terminates with an account of international agreements bearing on the control of production and the organization of the world market. The bibliography is quite extensive.

KESSLER, H. 634.11:582(49.4)

Apfelsorten der Schweiz. (**Apple varieties of Switzerland**).

Buchverlag Verbandsdruckerei Ag. Bern 1947: 2nd Ed.: Pp. xx + 139: 60 plates: and figs.

This is the second edition of this already successful book, which was first published in 1944. The varieties of apple described are essentially those important in trade; a second smaller group of varieties, also commercially valuable, includes varieties some of which are often

confused with each other. There are sixty coloured plates and seventy-nine in black and white, illustrating the different varieties. Synonyms, origins, characteristic morphological features, quality of flesh and keeping properties are given in each case. The photochrome off-set process in eleven colours used in printing the coloured plates has given remarkably good results and the drawings are extremely clear even in minute detail. The loose leaf method of binding is particularly well chosen for a book of quick reference. There is an index of varieties arranged alphabetically.

The author expresses the hope that the practical man, the student and others interested in fruit cultivation, sorting, grading, etc. may find their ability to recognise varieties increased by the use of this handbook and it is highly probable that this aim will be fully realised.

E. W.

635–1.531.12(48.5)
633.4–1.531.12(48.5)

NILSSON, E.

Köksväxtfröodling. (Cultivation of vegetable seed).

Nordisk Rotogravyr, Stockholm 1940: Pp. 160: figs.: illus.

This excellent little Swedish handbook, published in 1940, first sets out the reasons why Sweden should produce her own vegetable seed. Then the methods and precautions which should be adopted in raising pedigree seed, both stock and commercial, are described under various heads. The choice of situation for the seed plots; sowing; care during the growth of the mother plants and their winter storage and subsequent planting out; harvesting, drying and cleaning are among the practical problems dealt with in separate chapters, as an introduction to the detailed treatment of the different vegetable crops. The latter are grouped under the headings: legumes, tomatoes, cucumbers and gherkins, herbs (e.g. parsley), onions, leeks, root crops, rhubarb, asparagus, brassicas, lettuces and spinach. There are also a chapter on government seed control work in Sweden, and a good subject index, as well as a table of contents in which the crops are systematically arranged by similarity of use or required treatment in seed raising operations.

Written by a plant breeder, the booklet, which is also partly illustrated, should stimulate and assist in the development of high grade seed production in Sweden and other countries where the Swedish language is understood.

635.31

KIDNER, A. W.

Asparagus.

Faber and Faber Ltd., London 1947: 15s.: Pp. 168: 9 tables: 17 plates.

The author gives a comprehensive survey of methods of asparagus growing in Britain and abroad, with improvements suggested by his own experiences since 1931. Having been impressed, in a very short time, by the great heterogeneity and general low standard, in type, size and quality, of shoots from commercial stocks, he has also undertaken valuable breeding work. Although previous attempts at selection had been made, these seem to have involved only the female plant of this dioecious species, without the elimination of pollen from inferior plants. Mr Kidner has remedied this defect and very much superior stocks have resulted.

The book will undoubtedly be of interest to present and prospective asparagus growers. Perhaps it suffers rather by too frequent recourse to analogy and over elaboration of theoretical aspects in what is essentially a practical book, especially as the treatment of these theoretical aspects is somewhat lacking in accuracy, as indeed the author himself concedes in the introduction.

K. S.

Annali della Sperimentazione Agraria

The previous annals terminated in 1941 with the 40th volume and the publication has been resumed in a new form under the auspices of the Italian Ministry of Agriculture. It is designed to publish the results of work carried out in the research institutes dependent upon or subsidized by the Ministry of Agriculture and the first number, which appeared in May 1947, contains two articles of interest to plant breeders, one by E. Baldacci and R. Ciferri on cold resistance in Italian wheats and the other by A. Pirovano on heterosis in maize, both abstracted in this number of *Plant Breeding Abstracts*. The editorial committee contains several well known names. *Annali della Sperimentazione Agraria* are published in Rome by the Ministero dell' Agricoltura e delle Foreste.

Cacao Information Bulletin

The *Cacao Information Bulletin* is issued by the recently formed Inter-American Technical Committee on Cacao, which has its permanent headquarters at the Inter-American Institute of Agricultural Sciences, Costa Rica. The bulletin gives information on cacao development programmes in the Americas, personnel, details of economic and legislative trends, and other topics of interest to the cacao industry. Enquiries should be addressed to Ralph H. Allee, Director of the Cacao Centre, Inter-American Institute of Agricultural Sciences, Apartado 74, Turrialba, Costa Rica.

Proceedings of the Egyptian Academy of Sciences

The Egyptian Academy of Sciences has recently been founded in Cairo, in response to the growing importance of the sciences and the increase in the number of scientific societies in Egypt. The first volume of the Proceedings of the Academy contains six papers on botanical and zoological subjects; of interest to plant breeders is a paper by H. Said, "Plant reactions to colchicine treatment", describing experiments on cotton, lupin, bean, fenugreek (*Trigonella Foenum-graecum*) and radish. Arabic summaries of the papers are included.

Enquiries should be addressed to the Honorary Secretary, "Dar el Hikma", 42 Qasr el Aini Street, Cairo.

The Beet Grower

The Beet Grower is a monthly journal published by the Irish Sugar Co. Ltd., which is primarily intended for sugar beet growers in Eire. Its contents include articles on experimental work, and sugar beet production in other countries.

Enquiries should be addressed to the Editorial Offices, 7, Clare Street, Dublin. Price 6d. per copy.

INDEX

COMMONWEALTH AGRICULTURAL BUREAUX LIAISON OFFICERS

UNITED KINDOM
W. R. Black, Esq., M.B.E., Ministry of Agriculture and Fisheries, Block 4, Bickenhall Mansion, London, W.1.

CANADA
H. L. Trueman, Esq., Office of the Deputy Minister, Administration Service, Dominion Department of Agriculture, Ottawa, Ontario, Canada.

AUSTRALIA
J. E. Cummins, Esq., M.Sc., Officer in Charge, Information Service, Commonwealth Council for Scientific and Industrial Research, 425, St. Kilda Road, Melbourne, S.C.2, Victoria, Australia.

NEW ZEALAND
N. A. Marris, Esq., M.Sc., Department of Scientific and Industrial Research, Wellington, C.1, New Zealand.

UNION OF SOUTH AFRICA
J. L. Serfontein, Esq., M.A., Department of Agriculture, Union Buildings, Pretoria, Transvaal, S. Africa.

SOUTHERN RHODESIA
Dr. J. C. F. Hopkins, D.Sc., Department of Agriculture and Lands, Salisbury, S. Rhodesia.

COLONIES
G. F. Clay, Esq., C.M.G., O.B.E., M.C., Agricultural Adviser to the Secretary of State for the Colonies, Colonial Office, Palace Chambers, Bridge Street, London, S.W.1.

INDIA
Sardar Bahadur Sir Datar Singh, Vice-Chairman, Indian Council of Agricultural Research, Keeling Road, New Delhi.

EIRE
J. C. Nagle, Esq., Department of Agriculture, Dublin.

NEWFOUNDLAND
The Trade Commissioner for Newfoundland, 58, Victoria Street, London, S.W.1.

SUDAN
The Chief of the Research Division, Department of Agriculture and Forests, Wad Medani, Sudan.

COMMONWEALTH BUREAU OF PLANT BREEDING AND GENETICS
OFFICIAL CORRESPONDENTS

UNION OF SOUTH AFRICA
The Librarian, Stellenbosch-Elsenburg College of Agriculture, University of Stellenbosch, S. Africa.

ANGLO-EGYPTIAN-SUDAN
Chief of the Research Division, Department of Agriculture and Forests, Wad Medani, Anglo-Egyptian-Sudan.

SIERRA LEONE
The Director of Agriculture, Department of Agriculture, Njala via Mano, Sierra Leone, West Central Africa.

GOLD COAST
The Director of Agriculture, Department of Agriculture, P.O. Box No. 299, Accra, Gold Coast, Africa.

NIGERIA
The Director of Agriculture, Ibadan, Nigeria, Africa.

UGANDA
The Senior Botanist, Department of Agriculture, Entebbe, Uganda, Africa.

KENYA COLONY
The Senior Plant Breeder and Experimentalist, c/o Department of Agriculture, P.O. Box 338, Nairobi, Kenya Colony, Africa.

TANGANYIKA TERRITORY
The Plant Geneticist, E. African Agricultural Research Station, Amani via Tanga, Tanganyika Territory, Africa.

BECHUANALAND
Chief Agricultural Officer, Department of Agriculture, Mafeking, Bechuanaland.

SWAZILAND
The Principal Veterinary and Agricultural Officer, Department of Agriculture, Mbabane, Swaziland, Africa.

BASUTOLAND
The Director of Agriculture, Department of Agriculture, Maseru, Basutoland.

NYASALAND
The Director of Agriculture, Department of Agriculture, Zomba, Nyasaland, Africa.

SOUTHERN RHODESIA
Chief Agriculturist, Department of Agriculture, Salisbury, S. Rhodesia, Africa.

NORTHERN RHODESIA
The Director of Agriculture, Mazabuka, N. Rhodesia.

SEYCHELLES
The Director of Agriculture, Department of Agriculture, Victoria, Mahé, Seychelles.

SOMALILAND
The Veterinary and Agricultural Officer, Department of Agriculture, Berbera, Somaliland.

AUSTRALIA
Professor of Agronomy, Waite Agricultural Research Inst., Private Mail Bag, Adelaide, S. Australia; *and*
Officer-in-Charge, McMaster Field Station, Badgery's Creek, Liverpool, N.S. Wales, Australia.

British Guiana
The Plant Breeder, Department of Agriculture, Georgetown, Demerara, British Guiana.

British Honduras
The Agricultural Officer, Post Box 149, Belize, British Honduras.

Canada
Dominion Cerealist, Cereal Division, Central Experimental Farm, Ottawa, Canada.

Eire
Plant Breeding Department, Albert Agricultural College, Glasnevin, Dublin.

Falkland Islands
The Colonial Secretary, Port Stanley, Falkland Islands.

Fiji
Acting Economic Botanist, Department of Agriculture, Suva, Fiji.

India
The Director, Indian Agricultural Research Institute, New Delhi, India.

Ceylon
The Economic Botanist, Department of Agriculture, Peradeniya, Ceylon.

Jamaica
The Geneticist, Department of Science and Agriculture, Kingston, Jamaica.

Malayan Union
The Government Botanist in Charge, Department of Agriculture, Division of Economic Botany, Kuala Lumpur, Federated Malay States.

Mauritius
The Geneticist, Department of Agriculture, Reduit, Mauritius.

New Zealand
The Plant Geneticist, Wheat Research Institute, 197 Hereford St., Christchurch, New Zealand.

North Borneo
Director of Agriculture, Sandakan, North Borneo.

Palestine
The Director of Agriculture and Forests, Department of Agriculture and Forests, Jerusalem, Palestine.

St. Helena
Agricultural and Forestry Officer, St. Helena.

Bahamas
The Colonial Secretary, Naussau, Bahamas.

Barbados
The Botanist, Department of Science and Agriculture, Barbados, B.W.I.

Bermuda
The Director of Agriculture, Agricultural Station, Paget East, Bermuda.

Windward Islands: Grenada
The Superintendent of Agriculture, Department of Agriculture, St. George, Grenada.

Windward Islands: St Lucia
The Agricultural Superintendent, Department of Agriculture, Castries, St Lucia, Windward Islands.

Windward Islands: St Vincent
The Agricultural Superintendent, Department of Agriculture, Kingstown, St Vincent.

Trinidad
The Director of Agriculture, Department of Agriculture, Port-of-Spain, Trinidad.

Zanzibar
Director of Agriculture, Department of Agriculture, Zanzibar.

Hong Kong
Development Secretary, Hong Kong, China.

Cyprus
The Director of Agriculture, Department of Agriculture, Nicosia, Cyprus.

Leeward Islands
The Agricultural Superintendent, Department of Agriculture, Antigua.

PUBLICATIONS
of the
AMERICAN SOCIETY OF AGRONOMY
and of the
SOIL SCIENCE SOCIETY OF AMERICA

THE JOURNAL OF THE AMERICAN SOCIETY OF AGRONOMY

Issued on the 15th day of each month at Geneva, N.Y., U.S.A.

Contains original articles on research, teaching, and extension in soils and crops. Approximately 1000 pages a year and includes the proceedings of the annual meeting of the Society. Numerous back numbers also available.

Subscription price, $5.00 per volume (12 numbers) in the United States and Canada; $5.50 elsewhere. Sample copies supplied upon request.

GENERAL INDEXES (AUTHOR AND SUBJECT) TO THE JOURNAL

Index of Vols. 1-20, inclusive (1907-1928), 44 pages with covers $0.50 post paid

Index of Vols. 21-30, inclusive (1929-1938), 83 pages with covers $1.00 post paid

PROCEEDINGS OF THE SOIL SCIENCE SOCIETY OF AMERICA

Published annually at Geneva, N.Y., U.S.A.

Contains papers given at the annual meetings of the Society; also reports and business transactions.

$5.00 per volume post paid

Vol. 1 (1936), 526 pages, illus.	Vol. 5 (1940), 448 pages, illus.
Vol. 2 (1937), 602 „ „	Vol. 6 (1941), 521 „ „
Vol. 3 (1938), 370 „ „	Vol. 7 (1942), 517 „ „
Vol. 4 (1939), 455 „ „	Vol. 8 (1943), 473 „ „

PROCEEDINGS OF THE FIRST INTERNATIONAL CONGRESS OF SOIL SCIENCE

Volumes 1 to 4 (Commissions I, II, III and IV, and V and VI, respectively)
$2.50 per set of 4 volumes, post paid

BULLETIN OF THE AMERICAN SOIL SURVEY ASSOCIATION (Discontinued)

Nos. XI (1930), XIII (1932), XIV (1933), XV (1934), XVI (1935)
$2.50 each, post paid

ADDRESS ALL COMMUNICATIONS TO
J. D. LUCKETT, *Editor*
American Society of Agronomy
and
Soil Science Society of America
GENEVA, N.Y., U.S.A.

THE COMMONWEALTH BUREAU OF PLANT BREEDING AND GENETICS,

School of Agriculture, Cambridge, England.

Consultant Director:
PROF. SIR FRANK L. ENGLEDOW, C.M.G., M.A., F.R.S., Drapers' Professor of Agriculture.

Director: P. S. HUDSON, Ph.D.

Assistant Director: R. H. RICHENS, M.A.

Assistants: MISS M. L. C. WILSON, B.A.
MISS T. ASHTON, M.A.
MISS M. WOOD, B.Sc.

Publications:

PLANT BREEDING ABSTRACTS.

Issued quarterly. Subscription 35/-, with Subject Index. (Subscriptions sent direct from within the British Commonwealth of Nations are subject to a reduction of 20%). Single copies 10/6 each. Drafts should be made out in sterling currency.

Copies of "Plant Breeding Abstracts" printed on one side of the paper can be supplied, for the convenience of readers wishing to cut up and file the references, at an additional cost of 5/- per volume.

Important Note.—Every effort is made to make Plant Breeding Abstracts as complete as possible and its notices of papers referring to plant breeding or the genetics of crop plants as prompt as possible. To aid in this, authors are invited to send to the Director copies of their papers immediately on publication.

Other Publications :

TECHNICAL COMMUNICATIONS	s.	d.
Joint Publication No. 1. Vernalization and Phasic Development of Plants ..	10	0
An Outline of Cytological Technique for Plant Breeders	1	6
The Action and Use of Colchicine in the Production of Polyploid Plants, by J. L. Fyfe	1	0
Field Trials: their Lay-out and Statistical Analysis by John Wishart	2	6
Joint Publication No. 3. The Breeding of Herbage Plants in Scandinavia and Finland	4	0
New and Promising Varieties recently described in the Literature (Issues 3, 4 and 6 .. .. each	1	0
Joint Publication No. 5. The Production of Seed of Root Crops and Vegetables	3	0
Photoperiodism in the Potato, by C. M. Driver and J. G. Hawkes	2	6
Potato Collecting Expeditions in Mexico and South America. II. Systematic Classification of the Collections, by J. G. Hawkes	7	6
Cultivation and Breeding of Russian Rubber-bearing Plants	2	6

TECHNICAL COMMUNICATIONS—*continued.*	s.	d.
Joint Publication No. 8. Forest Tree Breeding and Genetics, by R. H. Richens	5	0
The New Genetics in the Soviet Union, by P. S. Hudson and R. H. Richens ..	6	0
The Use of Heterosis in the Production of Agricultural and Horticultural Crops, by Miss T. Ashton	3	0
Technique of Breeding for Drought Resistance in Crops, by Miss T. Ashton ..	2	6
INDEXES		
Subject Index to Vols I to V of Plant Breeding Abstracts	2	6
Subject Index to Vols VI to VIII of Plant Breeding Abstracts	2	6
Subject Index to Vols IX, X, XI, XII and XIII of Plant Breeding Abstracts each	2	6
BIBLIOGRAPHICAL MONOGRAPHS		
Bibliography on Interspecific and Intergeneric Hybridization in Relation to Plant Breeding	2	0
Rye Breeding Bibliography	1	6
Tobacco Breeding Bibliography	1	0
Bibliography of Baking Quality Tests, Supplement	1	6

Subscriptions to any of the above Publications should be sent to Commonwealth Agricultural Bureaux, Central Sales Branch, Penglais, Aberystwyth, Wales.

Loss in Transit.—Claims for numbers of Plant Breeding Abstracts lost in transit will only be considered if notice of such loss is received within three months of the date of posting.

COMMONWEALTH AGRICULTURAL BUREAUX

JOURNALS PUBLISHED BY BUREAUX ON RELATED SUBJECTS

	Published by the
Herbage Abstracts	Commonwealth Bureau of Pastures and Field Crops, Aberystwyth.
Field Crop Abstracts	Commonwealth Bureau of Pastures and Field Crops, Aberystwyth.
Horticultural Abstracts	Commonwealth Bureau of Horticulture and Plantation Crops, East Malling.
Soils and Fertilizers	Commonwealth Bureau of Soil Science, Harpenden.
Forestry Abstracts	Commonwealth Forestry Bureau, Oxford.

Annual subscription to the first four journals is 35s. (with a special reduction of 20 per cent for orders received direct from subscribers in Great Britain, the Dominions and Colonies); annual subscription to Forestry Abstracts is 45s. (with same reduction of 20 per cent).

RECENT AND FORTHCOMING OCCASIONAL PUBLICATIONS ON AGRICULTURE AND FORESTRY

C.A.B. JOINT PUBLICATIONS

No.		
10.	The Use and Misuse of Shrubs and Trees as Fodder. Commonwealth Bureaux of Pastures and Field Crops and Animal Nutrition and Commonwealth Forestry Bureau. 1947	9s. 0d.
11.	Some British Books on Agriculture, Nutrition, Forestry and Related Sciences, 1939-45. 1946	3s. 0d.
12.	Phenothiazine 1942–46: A review and bibliography. 1948	4s. 0d.

TECHNICAL COMMUNICATIONS, ETC.

Commonwealth Bureau of Plant Breeding and Genetics, Cambridge.

14.	Technique of Breeding for Drought Resistance in Crops, by Miss T. Ashton. February, 1948	2s. 6d.

Commonwealth Bureau of Pastures and Field Crops, Aberystwyth.

36.	The Grasslands of Latin America. By Miss G. M. Roseveare. 1947	7s. 6d.
37.	The Forage Resources of Latin America—Peru. By H. W. Alberts. 1947	2s. 6d.
38.	Advances in Grassland Husbandry and Fodder Production. Second Symposium. 1947	6s. 0d.
39.	Five hundred varieties of herbage and fodder crops. (A list of varietal names, including information supplied by specialists on the characteristics and use of the crops). 1948	15s. 0d.

Commonwealth Forestry Bureau, Oxford.

5.	Management in Selection Forests, with Particular Reference to the Application of the "Méthode du Contrôle" in Switzerland. By H. Knuchel. 1947	3s. 0d.

Commonwealth Bureau of Horticulture and Plantation Crops, East Malling.

18.	Fruit Fall and its Control by Synthetic Growth Substances. By M. C. Vyvyan. 1946	3s. 6d.
19.	Seed production of European vegetables in the Tropics. By A. G. G. Hill. 1948	2s. 0d.

Commonwealth Bureau of Soil Science, Harpenden.

44.	The Spectrographic Analysis of Soils and Plant Materials. By R. L. Mitchell. 1948	12s. 6d.

Commonwealth Mycological Institute, Kew.

21.	The cause of variation in the incidence of Blackarm disease of cotton in the Sudan Gezira. By A. S. Boughey. 1947	2s. 3d.
22.	The causes of variation in the incidence of Cotton Leaf Curl in the Sudan Gezira. By A. S. Boughey. 1947	2s. 3d.

All correspondence regarding subscriptions to current and back volumes of abstracting journals and the purchase of Occasional Publications, Technical Communications, Bulletins, Bibliographies, etc., to be sent to—Commonwealth Agricultural Bureaux, Central Sales Branch, Penglais, ABERYSTWYTH, Great Britain.

PRINTED BY W. HEFFER & SONS LTD., CAMBRIDGE, ENGLAND